'We Want Delivery Now'

Dave Trilling (right) of Trilling & Montague, Philadelphia Norge distributor, gives Glenn O'Harra (center), Norge eastern sales manager, an order for 44 carloads of refrigerators. Harry Montague looks on.

Engineer Explains Principles of Electrolux Operation at Los Angeles Meeting

LOS ANGELES—The Electrolux was described as "a mechanical refrigerator that operates without the refrigerant boiling" by H. W. Leighton of California Servel, Inc., before the February meeting of the Los Angeles section, A.S.R.E. last week. Mr. Leighton spoke on "Electrolux, the Gas Refrigerator."

Introducing his subject, Mr. Leighton said, "A specialist on refrigeration once made the statement that there are only two kinds of refrigerators, his and the others. I will adopt this same statement, because Electrolux, as far as we know, is the only gas refrigerator which operates without the refrigerant boiling. The pressure is equal in all parts of the system and the refrigerant does not boil. Instead, it evaporates.

"Not a Boiler"

"In other machines, evaporators are true boilers, as they are often called. In Electrolux we call the chilling coil, the evaporator or chilliator. If water is placed on a stove and boiled, 970 heat units are required for each pound changed to vapor. The same quantity on a table evaporates or disappears and in doing so also absorbs 970 heat units.

"In the Electrolux, the refrigerant evaporates rather than boils and so picks up the heat from the refrigerator. The mechanism is then used to convert the gas or vapor back to a liquid. If refrigerants were cheap we could allow them to boil and pass into the air, but since they are expensive, some sort of medium must be used to reclaim the gas.

How Heat Removal Is Accomplished

"Refrigeration," continued Mr. Leighton, "is the extraction of heat, and any time heat is removed, refrigeration takes place. In refrigeration we must take a low temperature heat-laden gas and remove the heat from it at a higher temperature.

"By compressing gas, we concentrate heat units in a smaller volume and so raise the temperature above the surrounding atmosphere so that this heat may be thrown off. All refrigerating machines except Electrolux, work on this principle."

The Electrolux has no moving parts, but is only a series of steel vessels containing hydrogen and about a quart of 30% aqua ammonia which is the medium used to produce refrigeration, according to the speaker.

Operation of Chilliator

"The original Electrolux units which were manufactured up until last year were all water-cooled. In the condensing cycle at the rectifier, 40 per cent of the ammonia condensed was used to remove water vapor from the ammonia vapor. Through the use of a submerged analyzer, this 40 per cent is now saved, resulting in increased overall efficiency.

"One of the interesting features of the new Electrolux is the chilliator, which utilizes a varying amount of surface, depending on the load placed on the unit," he said.

"In the old type of Electrolux, the thermostat controlled the box temperature only, allowing the chilling unit temperature to vary, thus at room temperatures below 50° F. the chilling unit would frequently defrost while maintaining proper box temperature.

"In order to eliminate this, the thermostat bulb location was changed so as to control the chilling unit temperature and allow the box temperature to fluctuate as necessary. Again at temperatures below 50° F., box temperatures frequently went below freezing, causing damage to food.

"In the new air-cooled Electrolux at low temperatures, only the lower part of the chilliator is active. This contains the ice trays so ice can always be frozen. As the temperature increases, the upper section of the chilliator also begins to refrigerate and thus by varying the refrigerating surface, box temperatures as well as freezing compartment temperatures are held constant," he concluded.

Why Hydrogen Is Used

At the conclusion of the talk some of the questions asked were:

Q. Why was hydrogen chosen for use in the Electrolux?

A. Almost any inert gas would work satisfactorily in the Electrolux, but hydrogen has three distinct advantages. In the first place it is the lightest of all commercial gases, in the second place it has no effect on the steel parts of the units, and in the third place, it is insoluble in water.

Q. What effect does the operation of Electrolux have on room temperature?

A. When operating under a full load, Electrolux produces approximately 2,900 B.t.u. per hour. Since this heat rises to the top of the room, it has been shown that room temperatures have not been increased over 2° F. as a maximum by use of the Electrolux.

Ice Cream Cabinet Application

Q. What type of unit is used on ice cream cabinets?

A. Water-cooled units are always used because air-cooled units require high gas heat exchangers which cannot be built in the height of an ice cream cabinet. In ice cream cabinets, the heat is absorbed through an hermetically sealed methyl chloride system, the tubing in this system encircling the cabinet holes and operating in much the same manner as the methyl chloride system in the air-cooled Electrolux.

Develops Mechanism for Revolving Displays

CHICAGO—Merkle-Korff Gear Co. of this city is introducing a revolving mechanism for the display of electric refrigerators, washing machines, and other household appliances in a dealership or distributorship. The new turntable is recommended for balanced loads up to 500 lbs.

New Subsidiary Formed By American Radiator

(*Concluded from Page 1, Column 1*)

general sales manager for the American Radiator Co., and Frank B. Stubbs, who has been in charge of the Bureau of Air Conditioning that was maintained by the American Radiator and Standard Sanitary Corp. during the preliminary work that preceded the formation of the new division.

Subsidiaries of the American Radiator and Standard Sanitary Corp. manufacturing air conditioning equipment include American Blower Corp., Campbell Metal Window Corp., Fox Furnace Co., Ross Heater & Mfg. Co., Detroit Lubricator Co., and American Radiator Co.

To make it possible to have air conditioning equipment that will be part of the integral mechanical equipment of buildings, different types of equipment designed to meet different structural and economic situations, particularly in modernization work, have been developed by these firms.

Bureau Plans to Continue Cooperative Activity

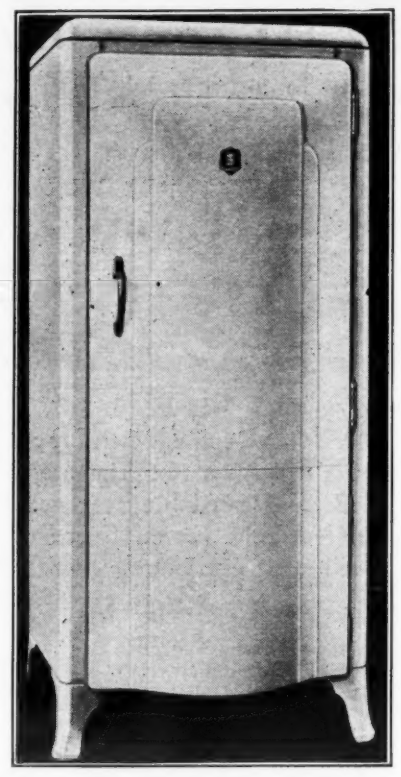
(*Concluded from Page 1, Column 2*)

either in whole or in part, a budget will be decided upon and funds provided for continuation until Jan. 1.

James E. Davidson of Omaha, president of Nebraska Power Co., who has acted as national chairman of the bureau since its organization three years ago, has resigned.

At the time he became head of the bureau it was understood that he would administer its affairs throughout the period of its activity, which was definitely set for three years. This period having ended, Mr. Davidson finds that other duties make it impossible for him to continue in active service.

Styled Mayflower



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Mayflower Has Styled Cabinets, New Features

(*Concluded from Page 1, Column 2*)

food compartment, Trupar officials point out.

The two standard models in the lower price range have plain cabinets; the "press button" door handle, a bumped porcelain liner in lieu of shelf hooks, the "remova-shelf," porcelain evaporator, and interior electric light.

The two standard models, HS-45 and HS-6 have 4.5 and 6 cu. ft. net food storage capacity and have an exterior finish in lacquer. Model H-6 has 5.9-cu. ft. capacity and is finished in lacquer; model HP-6 has the same capacity but has an exterior finish of porcelain. Model H-7 has 6.9-cu. ft. capacity and a lacquer exterior; model HP-7 is the same but has an exterior finish of porcelain.

Cabinets for the Mayflower line are made by the Rex Mfg. Co., and are insulated with Balsam Wool. All models are equipped with the Mayflower conventional type compressor.

1934 Apex Refrigerators Have Curved Lines

(*Concluded from Page 1, Column 4*)

manual, in the larger models it is semi-automatic.

Deluxe models have the following distinguishing features: twin cylinder compressor, polished lacquer exterior, dome light, door opening foot pedal, rubber ice tray, service tray, vegetable crisper and dairy rack. The cooling unit is the closed type, with door, and control is semi-automatic.

5 Distributors Receive Grunow Franchise

CHICAGO—Five new distributors have just been franchised by the General Household Utilities Co., manufacturer of Grunow refrigerators and radios here, according to H. C. Bonfig, vice president and sales manager.

They are: the Midwest Timmerman Co. of Dubuque and Davenport, Iowa; W. B. Davis Electric Supply Co., Memphis, Tenn.; Modern Appliance & Supply Co., New Orleans; Bruno-New Jersey, Newark; and Peaslee-Gaulbert Corp. of Jacksonville, Fla.

NRA MEMBER U.S. WE DO OUR PART

The right payment plan puts the sale on ice

It isn't so hard to make people want electrical refrigeration.

Every housewife knows its advantages — envies the neighbor who has it.

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THE NEWSPAPER OF THE INDUSTRY

ELECTRIC REFRIGERATION NEWS

WRITTEN TO BE READ ON ARRIVAL

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Kelvinator Brings Out New 20-hp. Machine, Fin Coil Line Extended

7 New Commercial Models And 2 Forced Draft Units Announced

DETROIT—Kelvinator Corp. is introducing a number of new commercial refrigeration products this year, including several new condensing units, the largest of which operates with a 20-hp. compressor, a complete line of continuous fin evaporators, and two new high-capacity forced-convection cooling units for commercial applications.

Last year Kelvinator's biggest unit was a 3-hp. model, but this year's line has been extended to include 5-hp., 7½-hp., 10-hp., 15-hp., and 20-hp. condensing units.

Chief features of the new series of large compressors are the shell-and-tube condenser, oil separator, suction and discharge valves in head, solid pistons, and cooling of the compressor head by the refrigerant in large air-cooled models. In addition, all Kelvinator condensing units from the ¼-hp. size on up are equipped with a high pressure safety cut-out switch.

Suction and discharge valves are of the Swedish steel reed type, in the valve plate. Cylinder and crankcase are of iron cast integral, except in the large U and V type blocks. Crank-

(Concluded on Page 2, Column 5)

York Develops Four New Freon Machines

YORK, Pa.—Through its new commercial division, York Ice Machinery Corp. has just announced the development of four small Freon refrigerating units, in ¼, ⅓, ½, and ¾-hp. sizes.

With the addition of these new smaller size Freon units the York company now has a line of commercial size refrigerating units ranging in capacities from ¼ to 5 hp. using Freon compressors, and from ½ to 10 hp. with ammonia compressors.

These new additions to the line are not basically different from other York refrigerating and air-conditioning equipment in mechanical principles, according to C. A. Pearson, national supervisor of the commercial division.

The cylinders are of electric furnace nickel steel, of high tensile strength and specified hardness, doweled to the crankcase and discharge head for proper alignment. The outer surface of each cylinder is of special finished design for the removal of compressor heat.

The crankcase is of the same material and curved lines of strength eliminate unequal stresses. Balanced pistons are of the double trunk type, providing cross head effect for even distribution of pressure on cylinder walls. The crankshaft is made of die-forged open-hearth steel and is short and rigid in order to eliminate distortion, Mr. Pearson claims.

York's new "Centriforce Oiler" delivers a constant stream of oil to the

(Concluded on Page 2, Column 3)

Promoted

H. G. Perkins, formerly assistant to the president of Kelvinator Corp., has been made a vice president of the company. He joined Kelvinator in 1929, and has been concerned chiefly with administration of the company's financial affairs.

9 Models Shown to EH & FA Officials

NEW YORK CITY — Nine manufacturers of household electric refrigerators presented models for the consideration of Electric Home & Farm Authority officials, headed by David E. Lilienthal, at a showing held here last week.

Individual manufacturers will later be notified by the EH & FA whether or not the equipment presented will

(Concluded on Page 2, Column 1)

Westinghouse Makes Coca-Cola Coolers

MANSFIELD, Ohio—Simultaneously with the announcement of the entrance of the Westinghouse Electric & Mfg. Co. in the field of manufacturing beverage coolers comes the announcement that Coca-Cola has selected the Westinghouse Co. to manufacture its entire 1934 line of coolers.

According to officials of the two companies, it is anticipated that the Westinghouse company will manufacture 50,000 coolers for the Coca-Cola Co. to take care of their bottlers' requirements for the coming year.

The line of coolers for the Coca-Cola Co. was given its premier showing at Atlantic City recently at the first of five conventions of Coca-Cola bottlers.

At this showing, under the supervision of Harrison Jones, executive vice president; Turner Jones, vice president in charge of advertising; and George Hunter, parent bottler, the entire line was displayed and the bottlers given instructions as to the

(Concluded on Page 2, Column 1)

Large Turnout Greets Frigidaires in Detroit

DETROIT — With approximately 450 dealers and salesmen, one of the largest turnouts in the history of the local branch of Frigidaire Sales Corp., the new Frigidaire line and sales plans were introduced to the Michigan field organization at an all-day meeting held last Wednesday.

W. D. McElhinny, manager, commercial division, led the crew which made the presentation. Other crew members included E. D. Doty, advertising manager; A. C. Frieman, C. E. Quigley, W. C. Yates, D. T. Hayward, W. F. Switzer, M. D. Weisenbarger, and P. F. Bunger.

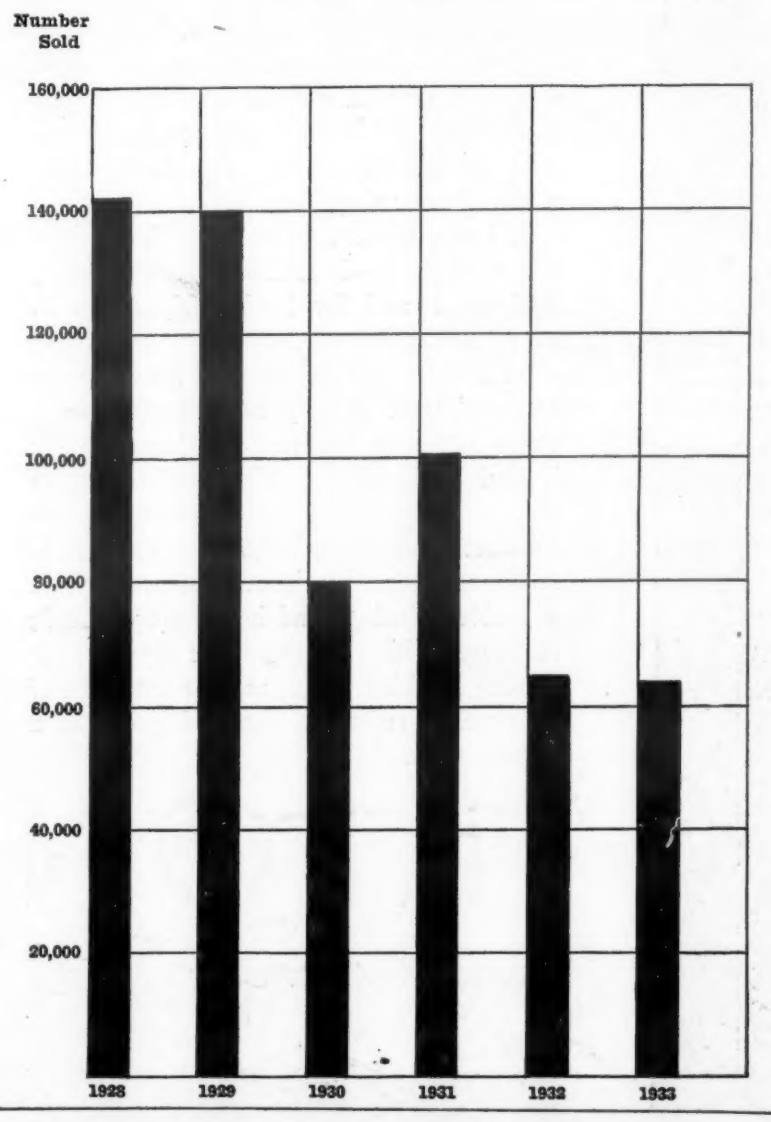
Two New Distributors Named by Sparton

JACKSON, Mich.—Horrocks & Ibbotson Co., 85-year-old concern in Utica, N. Y. has just been appointed distributor for Sparton refrigerators and radios, according to G. C. Core, advertising manager of the Sparks-Withington Co. here, manufacturer of Sparton products.

In Pittsburgh, the Houston-Starr Co., Sparton radio distributor last year, has just been franchised to handle the Sparton refrigeration line.

Commercial Machines Sales Low Again in 1933

1928	142,800	1931	100,400
1929	140,000	1932	64,500
1930	79,500	1933	63,600



Potter to Sell Directly To Dealers; Department Stores Are Not Wanted

Franchises Are Restricted To City Populations of 20,000 to 200,000

By George F. Taubeneck

BUFFALO—T. Irving Potter has three lines of "air conditioned" electric refrigerators (two of them brand new developments) to offer this year to 300 good dealers.

But there's a "catch" to it—he doesn't want metropolitan dealers, small-town dealers, or department stores. To those who meet his qualifications, he is offering an exclusive franchise in each city, and he will deal with them directly, rather than through distributors.

For 1934 the Potter franchise conditions are so extraordinary and so unlike any others in the industry that perhaps they should be singled out in list form:

Manufacturer sells directly to dealer, eliminating distributor.

Each dealer granted exclusive franchise in his city.

Dealers may, however, handle other makes of refrigerators.

Franchises offered only to dealers located in towns of more than 20,000 population and less than 200,000 population.

Department stores ineligible for franchises.

Only 300 franchises available.

Ranging from $165 to $369 (delivered, installed, and freight paid) the new Potter refrigerators for 1934 all incorporate "air conditioning" accomplished by means of dual evaporators. Each of the three lines, however, employs a different application of the

(Concluded on Page 10, Column 3)

Brunner Adds Two Machines to Line

UTICA, N. Y.—Brunner Mfg. Co. has extended its line of commercial condensing units with the addition of 2-hp. and 3-hp. water-cooled condensing units, for large commercial or air-conditioning applications.

Both of the new models employ a two-cylinder compressor and are mounted in a somewhat unusual manner, the compressor and motor being mounted on opposite ends of a long (54 in.) base, with the double-tube condenser between them.

The 2-hp. model operates at 400 r.p.m. and has a capacity of 1954 lbs. I.M.E. per 24 hours at 86° F. condensing and a 5° F. evaporator temperature.

The 3-hp. model operates at 525 r.p.m. and has a capacity of 2562 lbs. I.M.E. per 24 hours, under the conditions specified above.

Methyl chloride is the refrigerant used in these models. Either model may be equipped with pressure or temperature control, as desired by the user.

Larger Model Added To Shelvador Line

CINCINNATI — Just added to the Shelvador refrigerator line of Crosley Radio Corp. here is a new 5.51-cu. ft. (net capacity) model. This is now the third and largest model of the series featured by food shelves on the door interior (*not* the Tri-Shelvador line).

The new model, designated as EA-55, is 57⅛ in. high, 29 in. wide, 25-13/16 in. deep. It has a shelf area of 11.6 sq. ft., three ice trays with a capacity of 21 cubes each, and one double-depth dessert tray. Its other features are the same as those of model EA-43 in the Crosley standard line.

Price (delivered, installed) of the EA-55 in lacquer finish is $145, and with a porcelain exterior, $170.

Commercial Machine Sales for 1933 Set At 63,600 Units

By A. J. Cutting

DETROIT—Sales of commercial refrigerating machines totaled 63,600 units in 1933 according to estimates recently compiled by ELECTRIC REFRIGERATION NEWS.

By combining sales of Nema high sides and figures obtained from the Refrigerating Machinery Association with other data available, it is possible to present for the first time estimates of sales of commercial refrigerating machines, up to 10-ton capacity, during the years 1928 through 1933. The chart on this page shows the commercial machine record in graphic form.

The chart shows machines only and does not take into account commercial refrigerators with cabinets or other low side applications.

Manufacturers of commercial electric refrigerators sold an estimated total of 102,500 units during 1933, bringing commercial sales since 1923 to 1,418,800. Since 1929, when unit

(Concluded on Page 18, Column 3)

3,400 Replacement Sales Made in 1933 by Cole

NEW YORK CITY—In 1933, approximately 40 per cent of refrigerator sales made by the apartment house division of Rex Cole, Inc., General Electric distributor here, comprised replacement of other makes of refrigerators, according to the department's Manager Massimi. Replacement business totaled 3,400 units, he says.

Nema Code Changes Delay Industry Pact

NEW YORK CITY—Following the March 1 meeting here in which the changes in the code for the electric manufacturing industry proposed by the Board of Governors of the National Electric Manufacturers Association were discussed before representatives of the entire industry, the code committee of Nema is waiting to discuss the proposed amendments agreed upon with NRA representatives.

Because the changes proposed in the basic Nema code are so far-reaching, it is doubtful if further action will be taken on the supplementary code for the electric refrigeration industry until the future content of the basic code is definitely known, believes Louis Ruthenburg, consultant to the Refrigeration Division of Nema.

250 See New Grunows In Cincinnati

CINCINNATI — Some 250 dealers from this territory attended the meeting held March 1 at the Cincinnati Club by the Griffith Distributing Co., Grunow distributor here, to introduce 1934 Grunow refrigerators and discuss new merchandising programs.

Household Specifications In March 21 Issue

Detailed specifications of all popular makes of household electric refrigerators will be published in the next issue of Electric Refrigeration News, March 21.

This tabulation of data will show such important facts as food capacity, prices, finish, dimensions, type of system, and makes of the various parts used.

Please place your order for extra copies now. Be sure to send cash, money order, or postage stamps to insure prompt delivery. Price: 10 cents per copy.

SPECIFICATIONS OF 28 COMMERCIAL MACHINES IN THIS ISSUE

Westinghouse Makes Coca-Cola Coolers

(*Concluded from Page 1, Column 1*)

merchandising of the coolers. The new coolers, designed by Everett Worthington, were presented by J. W. Lehman, Coca-Cola engineer, who gave a technical explanation of the entire line.

According to H. M. Wible, manager of the commercial refrigeration division of Westinghouse, eight coolers comprise the Coca-Cola line this year. These models are:

Ice coolers—the "Junior," with a capacity of 51 bottles; the "Standard" with a capacity of 102 bottles; and "Master" with 144-bottle capacity.

Electrically refrigerated models include the "Standard" with a capacity of 102 bottles, and the "Master" with a capacity of 144 bottles. In addition, the line is made more complete by the inclusion of coin-controlled coolers in the "Standard" electric, "Master" electric, and "Standard" ice models.

The electrically refrigerated models are self-contained, compressor being located in a louvred compartment in the bottom of the cabinet. Cabinet design is modern, with rounded edges.

9 Models Exhibited to EH & FA Officials

(*Concluded from Page 1, Column 3*)

be financed in the Tennessee Valley Authority territory by the EH & FA. Manufacturers are submitting sealed prices on the models shown, for consideration by the authorities.

Most of the models shown were in the 3½- or 4-cu. ft. capacity range. Manufacturers who presented models included:

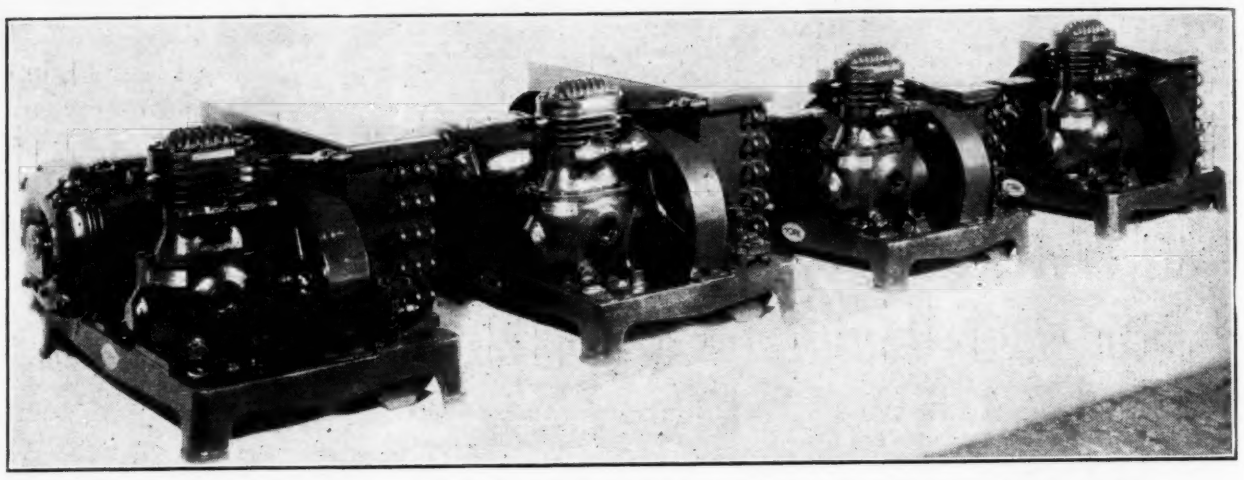
Crosley, Gibson, Frigidaire, Kelvinator, Leonard, Norge, Starr Freeze, Stewart-Warner, and Westinghouse.

1,600 G-E's Sold to New N. Y. Apartment

NEW YORK CITY—Largely through the efforts of Grosvenor Robinson, assistant manager of the apartment house division of Rex Cole, Inc., G-E distributor here, 1,600 flat-top General Electric refrigerators have been sold by the Cole organization for installation in the first unit of the Knickerbocker Village apartments.

Knickerbocker Village is the first of the new slum clearance projects.

York Develops 4 New Freon Units



York Ice Machinery Corp.'s new ¾-hp., ½-hp., 1/3-hp., and ¼-hp. Freon condensing units.

* * *

(*Concluded from Page 1 Column 2*)

thrust bearing. Main bearings are submerged in oil; wrist pin bearings and cylinder walls are lubricated by a splash system.

The motor is furnished to conform to the available current characteristics, and employs a special V-belt drive.

The condenser is of the copper-finned radiator type, with a metal casing and shield around it.

Kelvinator Builds 20-hp. Machine

(*Concluded from Page 1, Column 1*)

shafts are balanced and of drop forced steel. Crankshaft and connecting rod bearings are lubricated by an oil bath, the pistons and piston rings being oiled by a spray. Try-cocks are furnished in the larger models so that the refrigerant level can be easily tested.

The 5-hp. model has a 4-cylinder compressor, and operates with either methyl chloride or Freon as the refrigerant. The bore is 2¼ in. and stroke 3½ in. It operates at 590 r.p.m. for standard pressure operation, and at 400 r.p.m. for operation with high suction pressures. It has a capacity rating (using methyl chloride) of 4,920 lbs. I.M.E. per 24 hours, A.S.R.E. standard conditions.

The unit operating with the 7½-hp. motor is a two-cylinder model with a 3⅝-in. bore and 4½-in. stroke, operating at 400 r.p.m. The 10-hp. model is in the same compressor design and operates at 585 r.p.m.

The 15-hp. and 20-hp. models are four-cylinder models, with a V-type compressor design. Bore on these models is 3⅝ in. and stroke 4½ in. The 15-hp. model operates at 400 r.p.m. and the 20-hp. model at 585 r.p.m.

The last four described models operate with either methyl chloride or Freon as the refrigerant and can be used in either standard or high suction pressure applications (for air conditioning).

Other new condensing units this year are ⅓-hp. and ½-hp. models in the type "G" two-cylinder compressor series with 1½-in. bore and 1¾-in. stroke.

The new forced convection units are of the same design as the "FC" series introduced last year, but are larger, both of the new models operating with two fans.

Model FC-1836 is 42-7/17 in. wide, 18-9/16 in. deep, and 20-5/16 in. high, and has a capacity about 50% greater than the largest model of this type introduced last year. Model FC-2142 is 48-7/16 in. wide, 20-7/16 in. deep, and 23¾ in. high and has a capacity more than double that of the largest forced-convection unit introduced by Kelvinator last year.

Features of Kelvinator's fin cooling units include continuous copper fins, continuous copper tubing, hot dip plating, and three-way rigidity.

By assembling the new units in tiers, it is possible to use one continuous tube in each tier, eliminating the joints at the return bends. There are no soldered joints in the tubing. Brass connectors are used to join the tiers.

The center of the fin of each bend is depressed to form a broad surface into which the refrigerant tubing is placed. During manufacture the tubing is mechanically pressed tightly against the fins and dipped in hot metal.

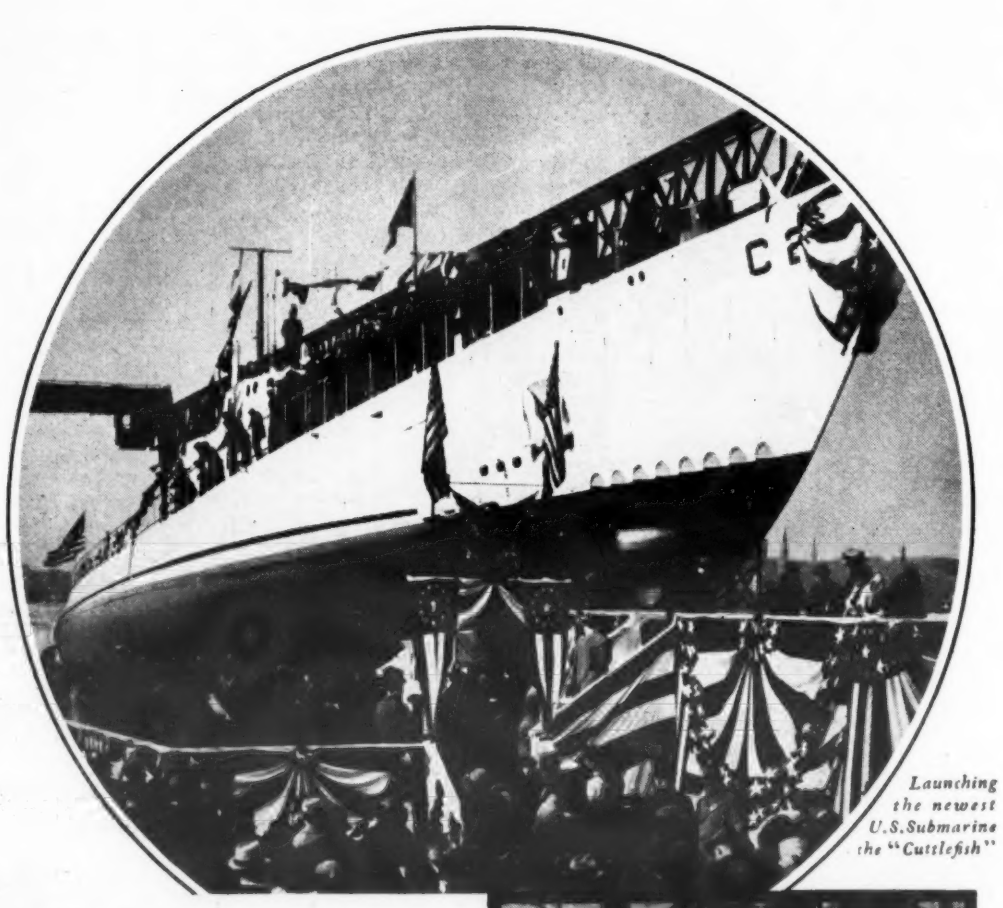
There are several different series of the new fin coils for various applications. The XAS-140 series is designed for top display cases; the XB-160 series for double-duty display cases and overhead-bunker type grocery refrigerators; the XB-390 series for heavy service walk-in coolers; the XC-130 series for back-bunker type display cases; the XB-320 series for storage compartments in double-duty display cases; and a "D" (deep fin) series for reach-in grocery refrigerators and end-bunker display cases.

New bare pipe cooling units include the PA-40, PA-60, and PA-80 series for new-type display cases using pipe coils underneath shelves, and the PB-80 series for low temperature work and truck refrigeration.

Another new commercial product introduced this year by Kelvinator is a 15-tray ice cube maker, with a capacity of 41 lbs. of ice at one freezing. It is designed for insertion into large-size domestic models or commercial cabinets. The trays rest on sheet metal shelves, with grooves in the lower sheet to form tubular passages for the refrigerant.

Where human life requires extra protection . . .

"FREON" IS USED!



Launching the newest U.S. Submarine the "Cuttlefish"

MANUFACTURERS OFFERING FREON REFRIGERATION EQUIPMENT:

Baker Ice Machine Company
Baldwin-Southwark Corporation
Carbondale Machine Company
Carrier Corporation
Cooling & Air Conditioning Corp.
Dersch, Gesswein & Neuert, Inc.
Frick Company, Inc.
Frigidaire Corporation
General Electric Company
General Refrigeration Corporation
Kelvinator Corporation
Liquid Cooler Corporation
Pennsylvania Engineering Corp.
Pullman Car & Manufacturing Co.
Reliance Refrig. Manufacturing Co.
Universal Cooler Corporation
Vilter Manufacturing Company
Westinghouse Electric & Mfg. Co.
Worthington Pump & Machinery Corp.
York Ice Machinery Corporation

ON SUBMARINE BOATS men live, work, and fight in manufactured air during the time the boat is submerged. The air must be kept pure!

The refrigerant used must not irritate the mucous membranes of the mouth, throat and lungs, or poison the sailors. It must not explode or decompose on coming in contact with the electric stoves used to prepare their food, and it must not destroy or impair the activity of the chemicals which purify the air they breathe.

It is for these reasons that Freon—the safe refrigerant—is used in air-conditioning equipment and for food refrigeration in many submarines.

"Freon" is also widely used for the comfort cooling of railway cars, homes, banks, office buildings, theatres and hospitals. It is used for the air conditioning of the holds of ships bearing citrus fruits from Florida to the Eastern markets; for fur storage; for foodstuffs stores; for libraries and museums where valuable paintings and books are exposed; for stores selling photographic supplies; for cooling drinking water; and for hundreds of uses where safety of life and goods is a requirement.

FREON
REG. U. S. PAT. OFF.
a safe refrigerant
KINETIC

KINETIC CHEMICALS, INC., TENTH & MARKET STREETS, WILMINGTON, DELAWARE

THE THREE IMPORTANT FACTORS

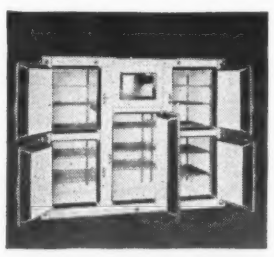
in profitably selling commercial refrigeration

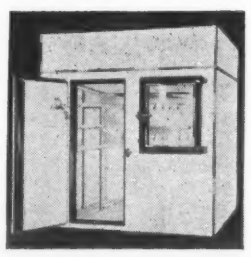
① A dependable product backed by a well-known name.

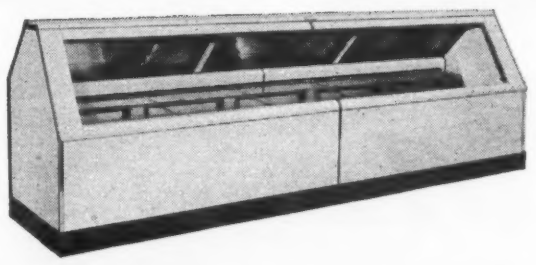
② A complete line for every business requirement.

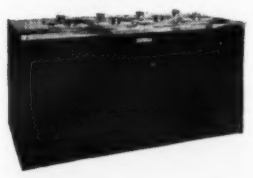
③ Knowing HOW to present and sell it.

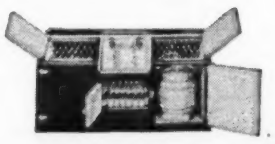
● In the complete line of G-E Commercial Refrigeration is equipment for every type and size of business, including food storage cabinets, "reach-ins," "walk-ins," display cases, bars and bar equipment; ice cream cabinets; soda fountains; ice makers; water coolers; milk coolers; etc. Prospects include meat markets, groceries, drug stores, restaurants, barbecues, hotels, hospitals, schools, institutions, offices, factories, dairies, dairy farmers, etc.

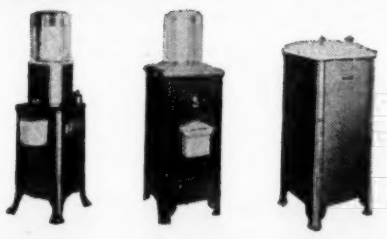


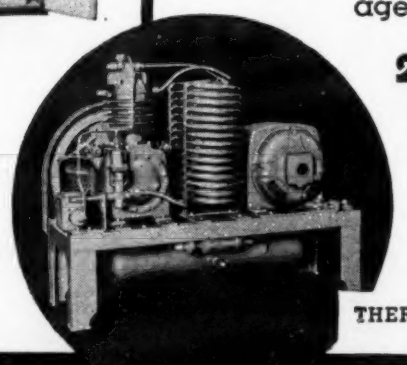












You have all three with GENERAL ELECTRIC

COMMERCIAL REFRIGERATION

1. General Electric Commercial Refrigeration is backed by the greatest name in electricity. It is unmatched for dependable performance and low-cost operation. G-E *Conditioned-Air* for food preservation marks the greatest development in the history of commercial refrigeration. It is available *only* with G-E equipment and actually pays for every G-E installation where it is used, out of the savings it makes possible for the merchant. G-E *Conditioned-Air* refrigeration not only cools the air in food storage cabinets, display cases, etc., but it humidifies, circulates and washes the air—keeping foods fresh, attractive, inviting; reducing shrinkage and discoloration to a minimum.

2. General Electric makes a complete line of commercial refrigeration equipment for every purpose.

3. General Electric provides dealers handling G-E Commercial Refrigeration with the *only* complete and comprehensive sales training course in the industry. Through a series of instructive slide films, supplemented by sales training bulletins, covering every conceivable application, G-E dealers are schooled in the product, its uses, its markets, how to calculate jobs, how to make surveys and submit proposals. In short, they *know* what they are selling, *who* are the buyers, and *how* to sell them.

Plus business at a very satisfactory profit awaits dealers who add the sale of General Electric Commercial Refrigeration equipment to their present activities. Write or wire for details of the G-E franchise in open territories. Address General Electric Company, Electric Refrigeration Department, Section DF31, Nela Park, Cleveland, Ohio.

THERE'S A GENERAL ELECTRIC CONDENSING UNIT FOR EVERY PURPOSE. SIZES FROM ¼ H. P. TO 20 H. P.

Quinn Believes Large Companies Will Aid Oil Burner Industry

PHILADELPHIA—T. K. Quinn, vice president of the General Electric Co., was the leading speaker at "Dealers Day," Wednesday, March 7, of the eleventh annual oil burner exposition. Mr. Quinn, in attempting to "explain, justify, and defend the position of the large manufacturer in the oil heating industry," discussed specifically some of the following questions:

Economic Limitations

(1) Are there any economic limitations affecting the participation of large producers in this industry?

(2) Does size alone justify industry participation and an assumption of constructive competition?

(3) Is a large corporation likely to succeed in any activity it undertakes?

(4) Is the trend in industry generally and in the oil heating industry particularly, toward fewer and larger competing units?

(5) What considerations govern the decision of a large manufacturer to enter this field?

(6) Would it be fair for a large manufacturer to sell at lowest prices and at a loss in one industry and make up this loss on other lines of business?

(7) What contributions can the large manufacturer make to the success of the oil heating industry and how may he do it?

(8) Does the General Electric Co., in particular, expect to gain its volume by taking business away from competitors—and—

(9) Does the General Electric Co. expect to underquote and undersell its competitors?

Specialization Best

"There are," declared Mr. Quinn, "definite economic limitations on the scope of activity of any organization, whatever may be undertaken. As a rule, a single company will do best in a single chosen field, just as an individual may concentrate and specialize to advantage.

"Any number of illustrations could be given to show the disastrous results of straying off into other pastures, where inexperience and lack of knowledge, improper temperament, and poor equipment, spelled ruin.

"When any institution gets so large in diversification that it cannot be intelligently controlled and operated by a single, responsible management, it has probably passed the point of maximum efficiency.

"Size alone may not bring trouble. It is the various requirements of different businesses which may be complex, confusing, and beyond the grasp of any one management.

It was the speaker's opinion that the mere size of an organization, considered as a separate and distinct matter, should command no added respect on that account alone, except insofar as size may reflect quality, performance, and good-will over a period of years. "It does not require different degrees of art to paint a picture big or little," he illustrated. "The intelligence in the work is more a matter of right proportions than it is one of quantities of money or material. Many a corner store is more capably and efficiently managed than some corporations.

Size Not a Factor

"I know at least one corner store owner, who, in his way, is as fine and as able a man and manager as any I have ever met in what is called 'big business.' He is a lovable philosopher who does not require any feeling of great size or power for his happiness.

"In any given field we may find constructive and destructive factors, without regard to size. I believe, however, that not so much as a result of size, but rather as a cause of it, large corporations are more likely to be cooperative and constructive than otherwise.

"There is nothing remarkable about this, either. The positive qualities are simply reflections of intelligence; and because of the size and amount of risk, stockholders must insist upon maximum intelligence in the management of large enterprises.

"Civilized commerce and industry require cooperation, constructive effort, and enlightened self interest. Size and success over a period of time in business are evidences of sane policy and practice.

Good Management

"When very rare and exceptionally capable management is secured, capital and credit are readily available to it. The pressure to add new and greater responsibilities, even in wholly unrelated fields, increases. It requires wisdom and strength to resist and think of the enterprise as an institution for service in a limited field, for the ages, rather than a temporary business to live and die with individuals, however capable they may be."

There has been an undeniable trend toward large industrial units and combinations of businesses during the past 50 years, Mr. Quinn pointed out. The great economies of mass production and mass selling and the desire for stability are chiefly responsible for this trend. It will probably continue in some basic industries, although there are rumblings of decentralization already in the air.

"There seems to be a natural law which, from the economic standpoint, tends towards integration," he continued. "Thus we have seen a gradually smaller number of large producers in certain fields. Mass production has meant lower costs in these industries, and has definitely increased efficiency of operation.

"Will the tendency be toward fewer producing units in the oil burner field? My guess is that it will not. The cost of selling and installing is too large a proportion of the price of oil heating equipment, and the nature of the product does not lend itself readily to substantial cost reductions in mass production.

"In the case of my own company, we always hesitate to enter any branch of industry which is new to us. Our destiny is bound up in the electrical business, and our purpose and intention is to confine ourselves to it. In our research and engineering work we are constantly discovering new applications for electricity and to capitalize on these discoveries we are led into those new branches of the industry.

Heart of the Furnace

"We are in the oil heating business because the heart of the modern oil furnace is the electrical motor and control, and because we made certain discoveries relating to heat transfer, which were new.

"Electric oil heating may be classified as a separate industry, but from one viewpoint it is a part of the electrical industry in that the controls and motor are electrical and constitute a major part of the complete equipment.

"We rather scrupulously avoid entering any new branch of the industry unless we can make substantial contributions to it. We do this as a matter of company policy, not to be altruistic, but because we have learned from experience that only on the strength of what we contribute may we hope to profit.

"Even then, only the fields which offer opportunities for stabilization and steady progress in the future, attract us.

"As our research and inventions usually mean additional service features for the users of our products, and because they are developed at some cost to us, our prices are generally higher than those prevailing in the industry. In the oil heating field, as you know, our product is now and distinctive. I believe also that our prices are highest in the field.

"It would be possible for any large and well financed manufacturer to enter any field and operate in it with lowest prices and at a loss, to the disadvantage of competition. The loss could be made up on other lines.

"This is obviously a most unfair and destructive practice. If it is followed anywhere in American business, it should be strongly condemned in the interest of fair play, honest competition, and the ultimate good of the consumer.

"On the other hand, in a comparatively new industry with almost unlimited opportunities, where the great problem is market development, the entrance of large corporations which will compete fairly should tend to stabilize the business, and to gain public confidence.

"There are millions of homes in America which could and should use oil heating to advantage. As only a comparatively few thousand actually use it now, the major task of the industry is to extend and widen the market.

Market Potentials

"Those who look upon the industry broadly will see how great a mistake it is to think only in terms of dividing up the relatively few immediate prospects among present competitors.

"When a market is regarded as definitely fixed and a feeling or fact of over production in it govern the competitive attitude, the result is very likely to be ruinous price cutting and inevitable losses.

"The public loses too, because the prices are too low to permit any constructive work in research, engineering, or extension of use. This industry seemed to be headed in the direction of that mental attitude without good cause.

"We confidently believe that the entrance of the General Electric Co. as a competitor had the effect of stimulating the total market and adding potential volume to the business of all producers in it.

"The volume of business in this industry at the time we entered it was not sufficient to attract us. We thought in terms of the market opportunity and annual industry sales of 10 times the present volume.

"We should much rather have a fair share of this industry—developed to a point somewhere near its potential possibilities—than to have all of the present volume.

"On the job of developing a market for any new product, however worthy and useful, I can speak feelingly and from the fullness of experience.

"Good strong competition is one of the most essential factors. The electric refrigerator business would not be what it is today without the keen competition which characterize it. This is as true of dozens of others which could be cited.

"The electric dishwasher, an exceedingly useful device, languishes now for want of strong competition in the field. Won't some of you please come into the business and advertise and sell aggressively so that our business will also increase?

"Constructive competition, particularly from accredited companies in good standing, is most likely to be helpful in young industries.

"It happens that our product in this industry is a complete unit, including the furnace itself as well as the burner. We are advocating the use of a new complete oil furnace, as distinguished from an accessory burner. From one viewpoint, at least, we are not directly in competition with burner manufacturers.

Separable Burners

"Does our advocacy of complete units tend to limit the market for separable oil burners? Let me answer that question in this way. It is perhaps generally true that new devices and applications are often introduced first as accessories, and that gradually they are made a part of the original equipment.

"But this is too broad a generalization to apply exactly in every given situation. The normal length of service of apparatus already in use must be considered; also its price and the ratio of the price of the accessory to the total equipment.

"The invention of a new and superior horn, to use an extreme example, will not obsolete automobiles now in use. My guess is that separable accessory oil burners will be sold in quantities, and represent an appreciable percentage of the total volume, 10 years from now.

"I also believe that the volume of business in complete new oil furnaces will increase from year to year. More and more people will be sold on the comfort, convenience, and economy of oil heating. This will come as a result of the combined effort of all of us, and of the service and satisfaction which our installations give.

"In almost any large market, such as we have in the potential opportunity to sell devices to 20,000,000 wired American homes, fair and constructive competition will not bother any of us.

Large Manufacturers

"The chances are that every manufacturer in the business will do better with large corporations as competitors, which sell fairly, than they would without them. I do not mean to say that the presence of large and well known competitors in the field will make every business successful, but it will enhance the opportunity for success.

"In these days of reconstruction and recovery, the whole country is thinking more and more in terms of the greatest good for the greatest number. The NRA plan of self-governing trade associations in basic national industries, upon a cooperative basis, is one of the most hopeful signs on the whole industrial horizon.

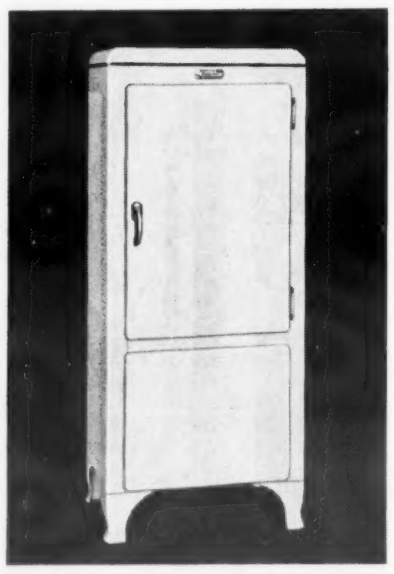
"We are glad of the opportunity to go along with you in this industry and in this association. We expect to get our volume out of what we shall add to the total volume of the industry, rather than by taking it away from our competitors.

"We have made most of what success we have upon the principle of adding something to the quality, service, and usefulness of our products, rather than by accepting old ideas and old products and selling them as cheaply as possible." Mr. Quinn concluded his speech by asserting that the General Electric Co. does not expect to underquote or undersell anybody as a matter of policy or practice.

Fedders House Organ Describes Products

BUFFALO—Fedders Mfg. Co. is now circulating the *Fedders News*, an illustrated publication in abbreviated tabloid form, to field organizations distributing Fedders equipment.

Editorial content is devoted principally to description of Fedders products and applications, with detailed explanation of the operation of some of the products.



COPELAND
DOMESTIC
REFRIGERATORS

The new Copeland line comprises 7 models; three porcelain finish cabinets; four in Lacquer. Sizes are from 4 to 7.5 cu. ft. net storage space.

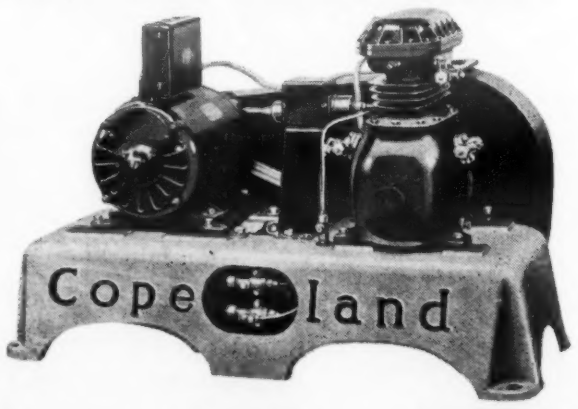
All condensing units are bottom-mounted; belt-driven; slow speed compressors.

Superb merchandise, attractive prices, protected territories, and world-wide acceptance are four of the principal reasons why Copeland appeals to progressive distributors.

Write today for complete details.

★

COMMERCIAL UNITS
Dependable - Efficient - Economical



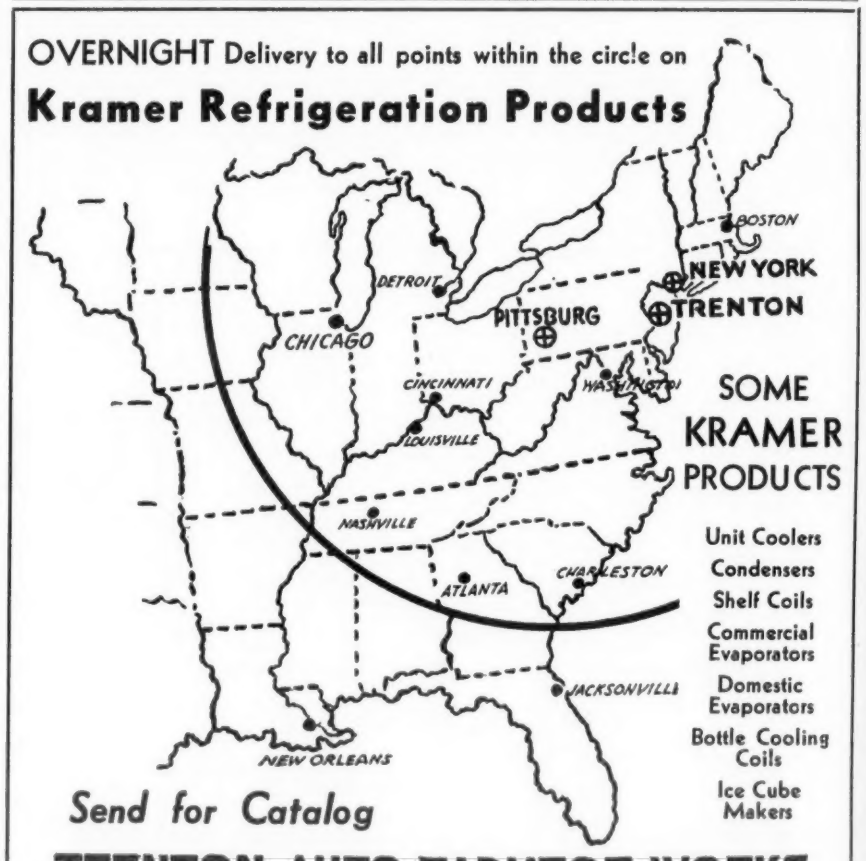
21 Commercial condensing units in capacities from 100 lbs. I.M.E. to 3250 lbs. I.M.E. per 24 hours are manufactured by Copeland.

The range of sizes provides the correct type and capacity for any installation in stores, hotels, meat markets, restaurants, apartment buildings, for water cooling or any other automatic refrigeration requirement.

Copeland compressors are made in 1, 2, and 3 cylinder models, with air or water-cooled condensers, motor or gas-engine driven.

COPELAND REFRIGERATION CORP., Mount Clemens, Mich.

OVERNIGHT Delivery to all points within the circle on
Kramer Refrigeration Products



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DU PONT METHYL CHLORIDE, ESPECIALLY MANUFACTURED FOR REFRIGERATION USE
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- Small volume displacement per unit of refrigeration
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- Non-corrosive to ordinary equipment, even if moisture gets into the system.
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ENGINEERING

Continuous Refrigeration Provided in Kerosene-Burning Electrolux

By Dr. W. R. Hainsworth
Director of Electrolux Research Laboratories, Evansville, Ind.

THE ammonia-water absorption refrigerating machine can be adapted for use with almost any source of heat which is available at a temperature of 300° F. or over. If lower temperatures are used, the concentration of the "weak" solution becomes too high to permit absorption of ammonia at pressures which correspond to the evaporator temperature usually desired. Aside from the perversity of the weather, this temperature limitation is one of the principal reasons why sun refrigeration has not yet proven practical.

Electric heat is possibly the easiest to apply but the cost of energy in this form limits its use with the absorption machine. High pressure steam would also be relatively easy to apply but, obviously, is not universally available for household refrigeration.

Gas Refrigeration

Gaseous fuels are next in line. In this field the greatest progress has been made and the absorption refrigerator has become well established in manufactured, natural, and bottled-gas territories. In districts where gaseous fuels are not available or the price is relatively high, the absorption machine is still in the picture through the possible use of liquid fuels.

Kerosene is the natural choice and there have been several domestic size refrigerators placed on the market during the past few years which employ this fuel. These machines, of the *intermittent* type, require filling with kerosene and lighting about once a day and the cabinet temperature variations, although acceptable, are considerable.

The Electrolux system of *continuous* refrigeration permits continuous burning of the kerosene at a low rate and results in a more uniform cabinet temperature. Realizing this, the development of the kerosene operated Electrolux has been under way for some time and the unit has just been placed on the market.

The air-cooled unit, which is used, is essentially the same as that described in the March 29, 1933 issue of ELECTRIC REFRIGERATION NEWS. The principal changes are in the boiler system which had to be modified to enable the use of larger quantities of flue gas at a temperature considerably lower than the flue gas from a gaseous fuel.

Burner Had to Be Accessible

In addition it was necessary to locate the burner in a vertical, readily accessible position. The design finally adopted is shown in Figures 1, 2, and 3. The burner is located at the front of the cabinet in the unit compartment, and a removable hood directs the flue gas into the horizontal boiler. The flue gases pass through and around the boiler where fins are used to obtain the necessary heat absorption and pumping action.

The burner required the greatest amount of development effort since there apparently were no burners on the market, aside from lamp or wick type burners, which were capable of

Kerosene Electrolux

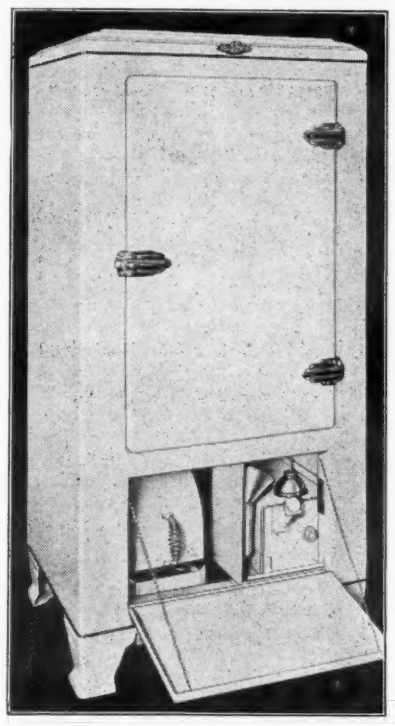


Fig. 1—New kerosene-operated Electrolux, showing unit compartment and supply tank.

burning the low rate desired. With the aid of the H. M. Sheer Co., Quincy, Ill., a burner of the dry well type was finally obtained which was capable of burning 0.3 to 0.7 gallons per day.

In this burner, which is shown in Fig. 3, the head of kerosene against the needle valve which controls the flow to the burner well is maintained constant by a double float. These floats reduce the sensitivity to tilting as well as permit installation of the supply tank independent of the burner level, and the burner operation independent of the kerosene level in the supply tank.

Chicken Brooder Type Burner

Thousands of burners operating on this principle have been used in brooders and hatcheries throughout the country. A manual cold control knob is attached to the needle valve to obtain the necessary refrigeration control. It was necessary, however, to add further refinements to control the maximum rate of kerosene burning since it is possible to reduce the efficiency and capacity of the Electrolux unit by giving it too much heat.

Furthermore, safety devices were considered necessary to provide against float failure or possible overheating. The maximum flow is regulated by close adjustment of the float level with respect to the burner well. The overflow, or float failure device, is similar to that employed on oil-burning equipment, where a trip bucket is used to close the supply valve.

Safety Cut-Out

The overheating device operates on the principle of the low melting solder overload cut-out employed on motor compression machines. When the solder bond between a fixed element and spring loaded movable element is broken by heat, the spring closes the kerosene supply valve. It must be manually reset before relighting.

The five-gallon supply tank is located in the unit compartment under the cabinet. A gauge on the tank indicates the kerosene supply and a special funnel is provided for filling. The unit compartment door is hinged in such a manner that it serves as a drip pan to catch any kerosene spilled while filling. Wooden frame members are encased in sheet metal.

To light the burner, the hood and burner cone are removed and the burner well is filled 1/3 full of kerosene from a priming can. The "starting" wick at the back of the well is lighted and the cone placed in position.

After a few minutes the hood is placed over the burner and the cold control set at number one position until the flame is burning satisfactorily. Normal evaporator temperatures are obtained in from three to four hours, after which the cold control is used to obtain the desired temperatures.

The cabinet is being produced in one size, namely, seven cubic feet with an ice cube capacity of 6.5 lbs.

The performance obtained with kerosene fuel is equal to the gas-operated cabinet. In a 100-degree room the average cabinet temperature can be maintained in the 40 to 45-degree range and freezing of 6.5 lbs. of cubes occurs in six to seven hours.

In a normal room the same quantity of ice can be frozen in three to four hours although it is, of course, necessary to turn the cold control knob to the coldest position to accomplish this and return it after freezing to prevent too low box temperature. If the cold control is left in the normal operating position the ice-freezing time is somewhat longer.

Kerosene Consumption Fairly Uniform

The kerosenes available in different parts of the country vary considerably in gravity, viscosity, flash point, end point, and other characteristics which affect the burner operation. However, the total B.t.u. content per lb. does not vary greatly and the kerosene consumption required for a certain cabinet temperature is nearly the same for the different grades.

It varies from a minimum of 0.3 gallons per day to a maximum of 0.7 with normal consumption in the neighborhood of 0.4 gallons per day. This compares with a gas consumption of 75 cubic feet of 540 B.t.u. gas for the same cabinet operated with manufactured gas.

Assuming the gas costs $1.00 per M., the cost of kerosene to give equal operating cost would be 18.75 cents per gallon. Since the cost of kerosene throughout the greater part of the country is considerably less than this, it is apparent that the kerosene refrigerator is economical in operating cost.

It is roughly equal to the cost of operating the gas refrigerator in natural gas territories where the cost is in the neighborhood of $1.00 to $1.25 a month.

Heater Assembly

Fig. 3—Front view of heater assembly.

Refrigeration Unit

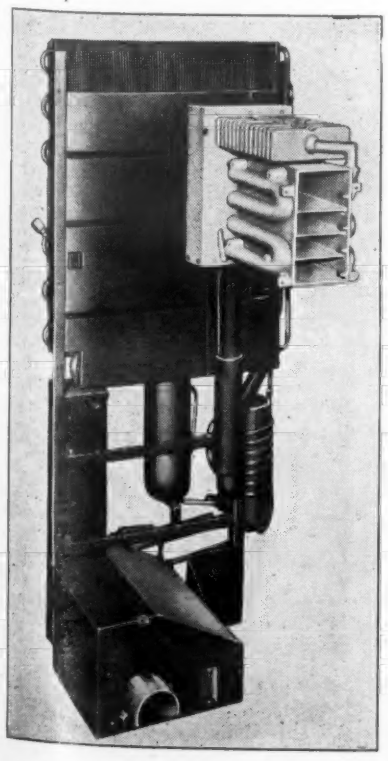


Fig. 2—Front view of refrigeration unit without cabinet.

Palmer House Buys Liquid Carbonic Bar

CHICAGO — Mechanically refrigerated equipment is used throughout in the bar which has been installed in the Palmer House hotel by Liquid Carbonic Corp.

The interior or "under side" of the bar is made entirely of steel, the construction being Armco metal covered with stainless steel. A few feet from either end of the long, slightly curved bar are mechanically refrigerated dispensing cabinets, one with six Liquid Zahm beer drawing tanks and a water coil and the other with five beer tanks and a water tap.

On either end and between the beer drawing section are three mixed drink and cocktail divisions, each fully equipped with necessary spaces for liquors, condiments, cracked and cubed ice, and the drain where glasses can be thoroughly washed immediately after use. Swivel faucets provide hot and cold running water at all times.

The back bar consists of a stainless steel base and full length of the 42-ft. bar, which is equipped with a liquor display and two refrigerated compartments for the keeping of wines at the proper temperature. The refrigerated sections are insulated with corkboard, the refrigerator doors are wood framed and cork insulated.

Hunker Joins G-E as Water Cooler Specialist

CLEVELAND — Paul A. Hunker, formerly associated with R. Cooper Jr, Inc., Chicago G-E distributor, has been appointed water cooler specialist for the commercial division of General Electric's refrigeration department.

Leonard's 1934 Selling Plan will bring them to your store . . .

EVERY refrigerator salesman likes his "floor days." Why? Simply because his customers come to *him;* he does not have to hunt them out. Because he has prospect and product *together,* and one helps sell the other.

Leonard, for 1934, offers a program that "short-cuts" the selling process — by bringing interested prospects, in large numbers, into the stores of dealers. A simple, practical, tested plan. One that sets the stage for easier, more profitable selling.

In every part of the country, this great program is already at work — backed by the biggest advertising drive and the finest line of refrigerators in Leonard's 53-year history.

Have you seen these beautiful new Leonards, and analyzed their sales appeal? Here is the *complete* refrigerator, combining beauty and quality with a list of convenience features that can't be matched at or near the Leonard price level. Eleven new models (5 all-porcelain), plug-in merchandise, covering 98½% of the household refrigerator market.

Aren't you interested in such a profit opportunity? Then write or wire for information. LEONARD REFRIGERATOR COMPANY, *14256 Plymouth Road, Detroit, Michigan, and London, Ontario, Canada.*

NRA (638)

LEONARD *The Complete* REFRIGERATOR

ENGINEERING

Oil Separators and Traps Useful in Both Household and Commercial Refrigeration

By Frank B. Riley, President, Riley Engineering Corp., Detroit

FROM the inception of their industry, makers of large refrigerating machinery have provided some means for removing or separating oil from the refrigerant after it left the compressor, but before it could pass through the liquid receiver and into the evaporator. They recognized the problem of returning this oil to the crankcase, regardless of whether the evaporator might be of the flooded type or merely a continuous coil, or whether the installation might be for extremely low temperature work or for normal-temperature requirements of preserving foodstuffs at temperatures above the freezing point.

It has been recognized by all that the return of oil from a continuous coil evaporator is fundamentally a more simple matter than with flooded type evaporators, due to the fact that the relatively high velocity of the gas in a continuous tube brings the oil back in the form of a foam, or bubbles.

The exception to this, of course, is in those installations where low temperatures foster a deposit of oil in the tube walls, and this continues to build up until the coil is completely plugged up, requiring a complete shut-down until the oil warms up and can be pumped back to the compressor.

Large Plants Have Supervision

These large plants are invariably "hand-operated," that is to say, they are looked after by operators who are supposed to know how to start, stop, and take care of ordinary operating requirements.

The oil traps used by these large units consist merely of a piece of pipe of varying length and diameter depending on the tonnage of the unit, with headers welded in both top and bottom, as shown in Fig. 1.

The inlet from the compressor is close to the top. Directly in front of it is a baffle consisting of a piece of sheet steel against which the gas impinges. In addition this baffle, due to its location, serves to prevent a direct passage of the incoming gas to the trap outlet fitting.

A hand-operated valve on the bottom outlet returns the separated gas to the compressor. As the compressors are provided with a sight oil level glass, the operator uses his own judgment as to how often to return the oil to the crank case.

As a matter of fact these rather crude settling tanks, or traps, work out quite satisfactorily on the large single-acting compressors, and there is little likelihood that compressors will run dry with an attendant in charge.

With the large double-acting open crankcase type compressors, where splash lubrication is impossible, very little oil carries over as only a relatively small amount of oil is used for piston lubrication.

Problems in Small Machine Design

With the advent of the small domestic machine, new problems were presented in the matter of oil return, due in a measure to the diversity of refrigerants and evaporators used in these small units.

Back in 1920 when the public was beginning to become "refrigeration-conscious," two types of evaporators accounted for 100 per cent of the installations, (1) continuous coils submerged in a brine tank and (2) the flooded type evaporator with low side float mechanism (much as it is used today). Sulphur dioxide was used in about 90 per cent of the machines in operation at that date.

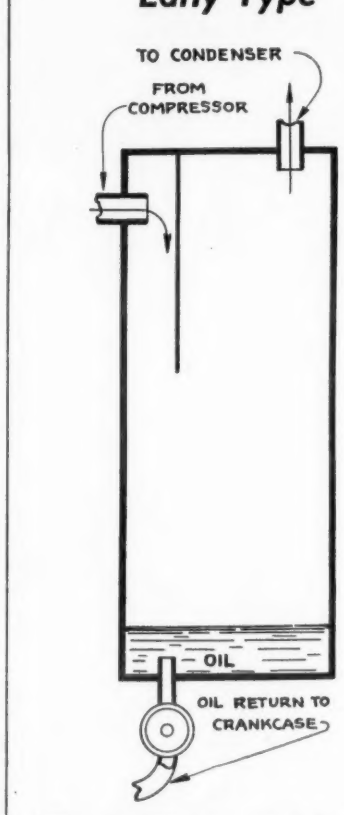


Fig. 1—Oil trap used in large industrial systems.

In 1922 methyl chloride came into use in a small way and about the same time iso-butane appeared on the map, followed several years later by F-12, F-114, methyl formate, Carrene and one or two lesser known refrigerants.

These various refrigerants all presented problems to the engineers in the matter of lubricating the moving parts of the compressor, and to a greater degree in getting the lubricants to return from the evaporators to the crankcase.

This latter difficulty was complicated by the type of evaporators used, i. e., flooded type (with either high or low side float valve), or continuous coils, top or bottom feed, the number of loops or traps in the coils for the lubricants to lodge in, etc.

By the same token, these various types of evaporators are closely allied with the problems of frost-backs, in which oil plays an important part.

However, it is not the purpose of this discussion to bring other troubles except those relating to lubricants, and the problems of getting it to return to the crankcase of the compressor after it leaves the discharge head, and before it has a chance to circulate, or perhaps refuse to circulate through the evaporator.

The designing engineer should not shoulder all the responsibility for the failure of the multitudinous experiments with lubricants.

Much of this can be laid entirely on the shoulders of the oil companies who recommended their various oils as suitable for this or that refrigerant, little understanding the chemical problems of the combination of oil and refrigerant and its performance under varying pressure and temperature conditions.

Again, various installations might require a totally different solubility of refrigerant in the oil in order to get a proper return from the low side. These problems, while now generally understood, were matters wholly outside the knowledge of the compressor designer as well as the oil companies. An oil suitable for high-temperature work might be totally unsatisfactory for low-temperature installations.

Refrigerants in which oils are miscible in all proportions require special handling in the matter of oil return. It is a mystery why so much time and money has been spent in trying to get oil out of evaporators when it is a comparatively simple matter to keep it out of the low side.

Oil Is Not a Refrigerant

It may be put down as Fact No. 1 that oil is not a refrigerant and second, that it serves no useful purpose on the low side of any system.

Everyone is familiar with the troubles experienced in multiple installations where oil would lodge in the evaporators at high levels while evaporators in floors lower down would have practically no oil in them.

Due to this condition, the calibration of the floats was thrown completely out of balance. These problems applied to the sulphur dioxide but even in larger measure to those installations where methyl chloride was used as a refrigerant, to the greater miscibility of methyl with oil.

It would seem that some of the small machine designers overlooked the lessons learned by large machine designers in providing means for keeping oil in the compressor where it belongs, and in large measure keeping it out of the low side, at least to the extent where it would cause no trouble whatever.

Notable Exceptions

There are a few exceptions to this general statement. One small unit manufacturer (using methyl chloride as refrigerant) right from the start of its business in 1925 used an oil separator and float ball return device as a component part of its compressor design. These installations, from the standpoint of oil return, were successful from the start, not only in domestic units but in multiple commercial installations as well. Low side float evaporators were used almost exclusively in these installations.

Another concern using methyl chloride had an oil separator with automatic oil return in all commercial and multiple installations and experienced exceptional immunity from oil bound evaporators. Still another concern using iso-butane, as early as 1923 and 1924 used an oil separator in their domestic evaporator units, and again trouble-free evaporators were the result. (See Fig. 2.)

A parts manufacturer in an Eastern location designed an oil separator with float return (see Fig. 3). This device had a direct acting float valve, but it was well baffled and while the design found no ready reception from machine manufacturers and was later taken out of production (1928-9), it had excellent possibilities as a separator with automatic oil return.

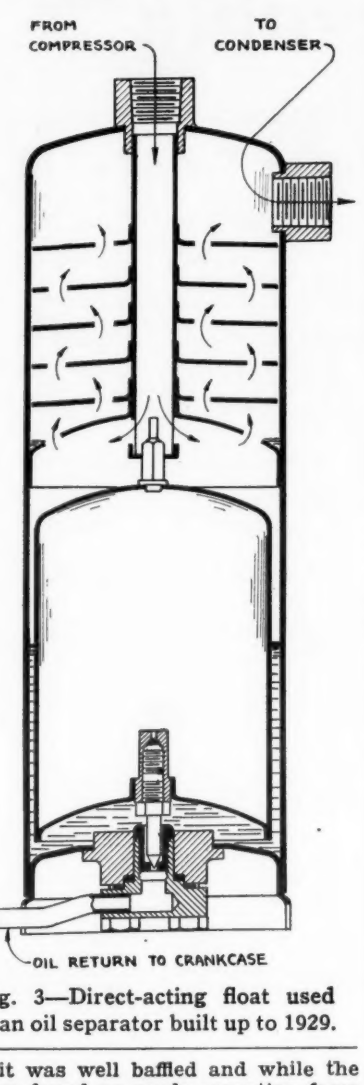


Fig. 3—Direct-acting float used in an oil separator built up to 1929.

Another interesting design has a set of revolving vanes, which are set in motion by the impulses of the compressor strokes and acts, in theory, much as a cream separator.

The Problems and Solution

An oil separator must, primarily, have sufficient volumetric capacity to slow down gas velocity to an extent that oil will settle out of the gas with which it is atomized as it leaves the compressor.

Second, it should have sufficient baffles, or other collecting means for the incoming gas to impinge against, or through which the gas must pass as the oil will gather much more readily on an oily surface than by the mere process of slowing down the forward motion.

Third, the boiling or evaporating point of any oil is much higher than the refrigerant with which it is carried along from the compressor and it condenses much quicker even under identical conditions of heat and pressure.

Fourth, the atomized oil and refrigerant has collected considerable heat from the compression strokes (sensible heat) and the large surface of the oil separator, combined with the slow movement of the gas, removes to a considerable extent the sensible heat and accelerates the oil in condensing from nebulous condition into its original liquid state.

Construction of Oil Separators

Briefly, an efficient oil separator with automatic oil return device consists of a shell, or chamber, through which the gas must pass after leaving the compressor and before it reaches the condenser. It should have efficient baffles, or "scrubbers," or some means to accelerate the separation of the gas and oil.

As a part of an automatically operating refrigerating unit, it must have a float, or other mechanism, for returning the condensed oil to the compressor crankcase as rapidly as it accumulates in the bottom of the separator shell.

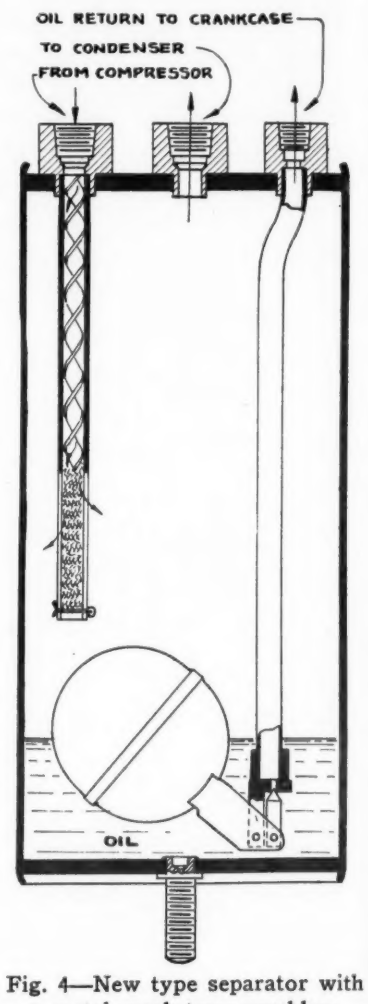


Fig. 4—New type separator with a metal mesh-type scrubber.

In Fig. 4 a device of this character is shown. There is a winding path for the gas to travel as it enters the separator shell, and at the end of this winding channel a maze of woven metal mesh called a "scrubber."

This scrubber just about completes the final separation of the oil and refrigerant. The float and needle mechanism is sufficiently high above the chamber bottom plate to prevent clogging the needle orifice with scale, or other foreign matter.

Design Details

There is more to oil separator design than merely to place a float mechanism in a shell and "hook her up."

The size of the needle orifice bears a definite relation to the buoyancy of the float ball in that the head pressures exert a piston effect on the needle, which must be overcome by float ball buoyancy. Otherwise the valve would not open, and the separator will merely become an oil receiver.

For the same reason friction loads must be watched carefully. Direct acting floats, as in Fig. 3, require a large float ball (due to absence of leverage) to overcome the friction in the guides and the piston effect above mentioned.

Summary

Oil separators with automatic return are inexpensive and every automatic commercial unit of ¼ to 10 tons capacity could use one to advantage. All units in which methyl chloride, Freon, or other refrigerants, in which the oil and refrigerant are miscible in all proportions, will find an efficient oil separator an economy in many ways, especially in multiple installations.

Oil carries along scale and other finely divided foreign matter such as oxides more readily than refrigerants in its travels through the refrigerating system, and usually this "dandruff" finds a convenient lodging place in the metering device, often plugging it completely. If they escape the screens provided, these fine particles act as a sand blast to erode the needle and seat and finally cause a leak serious enough to require replacement of the metering device.

Another function of the oil trap, sometimes overlooked, is its diligence in separating moisture from the system.

It has been observed that the oil separator also acts as a water separator and as the water settles to the bottom of the oil in the shell, it remains there where it does no harm. It is permanently imprisoned in a safe place.

Fig. 2—Oil separator with an automatic oil return used in a household system during 1923 and 1924. Note the influence of carburetor design.

Note This—Vinewood 1-5000

This is not merely our telephone number—rather it is the way we like to do business. It's quicker, its personal, it's more accurate. In three minutes we can know just exactly the delivery emergency you must meet—and you can know just exactly how real our service is. Telephone us. You will get action. Dehydrated and Sealed ("W") or Open End—plain or tin plated—coils or straight lengths—right out of stock—fast! Vinewood 1-5000. WOLVERINE TUBE COMPANY, 1491 Central Ave., Detroit, Mich. Sales Offices in 29 cities. Warehouse Stocks at convenient points. Export Dept., H. M. Robins Co., 120 Madison Ave., Detroit.

WOLVERINE
Seamless Copper Tubing
For Refrigeration

COMMERCIAL REFRIGERATION

Servel Machines & Koch Cases Used In Modern Market

ORLANDO, Fla.—The Orlando Food Palace, modern version of the old-time central food mart, erected here by Carey Hand, local capitalist, has been laid out in modern design and equipped with advanced-type refrigeration equipment.

Some 90 ft. of refrigerated display counter is used in this market. This equipment includes a special vegetable display case. A number of large storage refrigerators were also installed.

Display cases and market refrigerators were furnished by Koch Butchers' Supply Co. of North Kansas City, Mo. Servel condensing units furnish the refrigeration, while Larkin coils are used in all equipment but the vegetable display case, in which a special Fedders coil is used. Operation of the refrigeration equipment is automatic by means of the latest type expansion valve.

Built Into Cases

Coils for the display cases were shipped to Kansas City and built into the cases at the Koch factory. Fin coils were used throughout, and placed overhead in the case. All refrigeration lines were placed in the building before the floor was laid. Each case thus had its drain, electrical outlet, and refrigeration connection coming up through the floor at exactly the right spot.

Mr. Hand rents out stalls in the market to individual food merchants. Stalls in which refrigerated equipment was placed include two meat markets, one fish market, one poultry market, one delicatessen market, one dairy goods department, and one produce department.

The two meat markets are identical. Each is equipped with a 10-ft. double duty display case and a 10-ft. top display counter. Each also has a walk-in cooler, sixe 8x6 ft.

The fish market has a 12-ft. fish display counter, with Monel metal lined cracked ice pan. It is also equipped with a four-compartment fish storage box, approximately 10 ft. long.

Poultry Market Equipment

Equipment for the poultry market includes an 8-ft. poultry display case in which poultry is displayed on cracked ice, contained in a Monel metal pan; and a 6-door service refrigerator, which is approximately 8 ft. wide.

A three-shelf, 10-ft. refrigerated display case provides ample room for the display of many packaged items in the dairy goods section. A 6-door service refrigerator is also installed in this department.

The stall in which the delicatessen department is located has been equipped with a 12-ft. refrigerated display counter and a 6-door reach-in refrigerator.

One of the notable features of the market is the installation in the produce department of an 8-ft. self-service vegetable display case, which is set out in the center of the market.

This refrigerated vegetable case has sliding hard rubber doors on both sides and contains three display shelves. The case is equipped with a Fedders fluted fin coil of unusually large capacity, to compensate for the increased heat load caused by the double doors.

All of the refrigerator equipment was furnished in special design triple-coated porcelain enamel. The decoration on the porcelain is a light green to match the general color scheme. All display cases and refrigerators are also porcelain lined.

All equipment is insulated with Armstrong type LK corkboard, 4 in. thick in most fixtures, 2 in. in some fixtures in which low temperatures were not required.

The display cases, in spite of their varied interior arrangements, all present the same appearance from the front. Thus the stalls, which extend across the back and down both sides of the market, have a uniform appearance. The various counters are placed adjacent to each other, but are separated by wrapping stations and cash register stands.

Other refrigerated equipment in the Orlando food palace includes three built-in cold storage rooms, a 16-ft. soda fountain, and two drinking fountains.

Power bill for the first month's operation of this equipment was $96.50. In the second month, the power bill was only $76.41.

213-ft. Display Cooled By Universal Machines

OAK PARK, Ill.—The new super store opened last year by the Kroger Grocery & Baking Co. in this western suburb of Chicago has been equipped with a 10-hp. Universal Cooler methyl chloride condensing unit to serve its 213 ft. of refrigerated display. The compressor is installed in the basement of the store (see installation picture on page 20 of this issue)

Display cases were furnished by Bromann Bros. of Chicago, and the several different types of coils and forced convection cooling units were built by Refrigeration Appliances, Inc.

Largest of the refrigerators is a walk-in cooler for meats and produce on the main floor of the store, adjoining the meat counter. This cooler is 46 ft. long, 8 ft. high, 10 ft. wide, and is cooled by finned coils.

The 8x6x10-ft. vegetable refrigerator is kept at 36° F. by a forced draft cooling unit, as is the 8x10-ft kitchen storage room in the basement. The latter uses one of Refrigeration Appliances' "tunnel type" forced draft coolers, and is maintained at 40° F.

The display refrigerators include 82 ft. of delicatessen cases, 78 ft. of fresh meat display cases, 8 ft. of poultry cases, 8 ft. of fish cases, 8 ft. of butter tubes, 13 ft. of lard carton display, and two 8-ft. refrigerated windows in the front of the store.

Frigidaire Units Used in New Peoria Market

PEORIA, Ill.—A battery of Frigidaire commercial condensing units is furnishing refrigeration for a wide variety of refrigerator equipment made by Viking Refrigerators, Inc., in the new drive-in market recently opened here by O. F. Smith.

The "largest refrigerating capacity of any Peoria retail store" is claimed for the new market.

In the meat department are four 10-ft. Viking display cases and one 12x16 ft. storage cooler.

The delicatessen department is equipped with two 12-ft. Viking double-duty display cases. All display cases in the meat and delicatessen departments are finished in black porcelain and have a modernistic trim of stainless steel bands.

• • •

In Florida's New Super-Market

One of the many stalls in the Orlando food palace, which is equipped with Koch refrigerators of latest design and individual Servel units.

Commercial

CABINETS BY

Seeger

SAINT PAUL

THE demand for better food leads to the demand for better Commercial Cabinets like those made by Seeger. These cabinets not only help refrigerate foods economically and efficiently, but they are so appealing to the appetite in their white porcelain or lacquer exteriors and porcelain interiors that everyone is proud to show them.

One or more of the many models and sizes is sure to fit the needs of the alive grocer, butcher, hotel, club, institution or restaurant desiring as good a cabinet as can be made.

For over 30 years Commercial Cabinets by Seeger have been the standard of the industry, whether for electrical or mechanical refrigeration. They are sold through Dealers and Distributors of Electrical Refrigeration, as are the beautiful Display Cases by Seeger.

SEEGER REFRIGERATOR COMPANY

SAINT PAUL, MINNESOTA

New York — Los Angeles — Chicago — Boston — Buffalo
Philadelphia — San Francisco

(1) The Royal Family of ABC—Jack, J. H., and Joe Hirsch look over the list of refrigeration distributors who have signed ABC oil burner franchises. (2) E. A. Weil, ABC treasurer, reaches for a Corona Corona. (3) A pair of prospective distributors. (4) Signing the franchise. (5) Dave Trilling, Philadelphia Norge and ABC distributor, 'phones from the check-room table.

BY GEORGE F. TAUBENECK - - -

Three Kinds of Manufacturers

From a news-gathering standpoint, business paper reporters generally find that there are three kinds of manufacturers: those that want publicity, those that don't want it, and those that don't give a damn.

Problems are involved in dealing with each. In the first case, the publicity-minded manufacturer generally is insatiable, and is never satisfied until and unless you make your publication virtually a house organ for his company.

In the second case, extreme difficulty is frequently encountered in obtaining important and legitimate news.

It's the third type, though, that's the tough one. Interviewing somebody who doesn't seem to care whether his product story gets into your paper or not is generally harder than interviewing a man who is trying to keep you from getting the facts.

* * *

Spellbinder Potter

T. IRVING POTTER, president of the Potter Refrigerator Corp. of Buffalo, is a species of this latter genus. Even though he advertises in the NEWS, getting a product or merchandising story out of him is a major operation.

(After our first interview with Mr. Potter, as reported in the March 9, 1932, issue of ELECTRIC REFRIGERATION NEWS, we said: "You have to hang onto your chair to keep a grip on reality when you listen to him talk... He was one of the most difficult men to interview I have ever come across . . . So spellbinding is the president of Tricold that during the course of two days I was an hour late to a dinner party, three-quarters of an hour late to a luncheon engagement, an hour late to an afternoon date, and missed two trains—all because of his hypnotic conversational powers.")

On this trip we were ready and loaded for this master conversationalist. He had a good story, product-and-merchandising, and we knew it and wanted it. So when he'd launch upon a discussion of distribution theory, we'd counter with: "What horsepower motors are you using on each compressor?" And when he swung into an oral treatise on dealer responsibility, we asked if the new shroud for his evaporator was made of copper.

Best of all, we brought out the little candid camera. When all else failed, we'd take his picture. And that stopped him.

Lest all this joshing mislead you into thinking that Mr. Potter is a long-winded cuss who bores his audience, let us hasten to state that he puts on a good show.

The point is that Mr. Potter would much rather sell you on an idea or an editorial policy than on his product. And since Publisher F. M. COCKRELL is actively supplying us with just about all the ideas and editorial policy we can handle, what we're after is news about products and selling plans.

Now that we have the story, we're planning on a return trip to Buffalo just to be enthralled. Take it from us, T. Irving Potter puts on a real show.

* * *

Taylor, Bahr, et al

A. M. TAYLOR, who has been advertising manager of Copeland, advertising manager of Kelvinator, and merchandising director of Leonard, is now functioning as merchandising manager of Potter Refrigerator Corp.

His fine hand is easily discerned in the new Potter literature and sales promotion plans; and it seems assured that, hooked up with the unorthodox and original Potter ideation, some interesting advertising campaigns should emanate from Buffalo in the future.

G. E. BAHR, sales manager of the Potter Refrigerator Corp., was celebrating the sixth anniversary of his joining the Potter organization on the day we arrived in Buffalo. IRVING HALSEY, assistant to the president, has also been with Mr. Potter a long time.

A comparative newcomer, however, is Chief Engineer F. J. BOMMER. Quiet, modest, and efficient, Mr. Bommer has ready answers for all reportorial questions. And he can take down a unit while you're looking around for a match to relight your cigar.

* * *

Recap tulation

High up in the Graybar building on Lexington Ave., New York City, Manager GEORGE BROWN and his associates of the Electric Refrigeration Bureau are still carrying on. Their good work will be continued at least until July 1. One of their most important tasks is the collection and interpretation of statistics.

An analysis of the Electric Refrigeration Bureau's tabulation of refrigerator sales in the United States last year not only reveals some important facts on the progress of the electric refrigeration industry during the year but permits of some interesting deductions concerning the recovery of business in general.

In the first place, only 12 of the 48 states failed to reach the quotas set for them by the bureau at the beginning of the year, and 9 of those 12 scored better than 90%.

In 1932 only five states in the entire Union succeeded in reaching their quotas. It will be recalled that the 1932 national quota was 20% higher than that of last year, but an examination of the 1932 realization figures shows that only 12 states would have reached their goals had the quota for that year been 800,000 units, as in 1933, instead of a million.

Georgia registered the highest percentage of quota realization, 180.9, while Nevada finished in second place with 180.6%. Alabama with 178.8, Texas with 178, Virginia with 175.6, Maryland and District of Columbia with 172, and Missouri with 168.8 were the other outstanding leaders.

In the matter of total unit sales New York led the way with 205,383, while Pennsylvania ranked second with 103,564. North Carolina made the greatest proportionate gain over the preceding year, with 14,103 units sold as compared with 6,352. Alabama's sales jumped from 4,565 to 9,785, Georgia's from 6,538 to 11,828, Mississippi's from 1,793 to 3,327, and those of Texas from 20,669 to 37,293. Pennsylvania gained from 70,217 to 103,564, Ohio from 38,503 to 69,328, and South Dakota from 1,223 to 2,546.

Among the various regional divisions, the Southeastern division led all the others in quota realization with a percentage of 160.6. This division includes Alabama, Florida, Georgia, North Carolina, South Carolina, Tennessee, and Virginia.

East Central division, which includes Ohio and the so-called border states of Kentucky and West Virginia, was second with 155.1%.

Eastern division, which includes Delaware and Maryland in addition to New York, New Jersey, and Pennsylvania, was third with 152.7%, and the Southwestern division, consisting of Arkansas, Louisiana, Mississippi, Oklahoma, and Texas, was fourth with 143.6%.

North Central division, consisting of Minnesota, North Dakota, and South Dakota, with a percentage of 95.9, was the only one failing to reach its quota, while the Great Lakes and Northwest divisions, with percentages of 100.6 and 101.8, just managed to beat par.

All of which would seem to bear out the frequently repeated statement that it is the South which seems to be leading the way in our national recovery from the depression, while the North Central and far Northwest sections are apparently the slowest to join in the upward trend.

* * *

Birth of the Rubber Ice Tray

In the editorial on "Ice Cubes" (page 10 of this issue) we mentioned the fact that LLOYD G. COPEMAN of Flint, Mich., was on a duck-hunting trip when he made his discovery of the principle upon which the flexible rubber ice cube tray came into existence. Here's how it happened:

In addition to being a prominent business man in his home city, Mr. Copeman is also an inveterate duck hunter. Back in the winter of 1927-28, he was on one of his periodical trips to his favorite shooting grounds. But his ambition to get his bag of game didn't blot out a problem which had long been on his mind.

He had an intimate knowledge of the refrigeration industry, and he realized that an improvement urgently needed was that of eliminating the inconvenience of removing ice cubes from metal freezing pans. He had given serious thought to this problem, had experimented with various devices, but the real solution seemed as far away as ever.

On this particular hunting trip he was impressed with a significant fact. He noticed that ice froze as securely to his rubber wading boots as to metal surfaces. But, more important, he noticed that when the boots were flexed the ice was instantly separated —*breaking cleanly*—from the rubber surface.

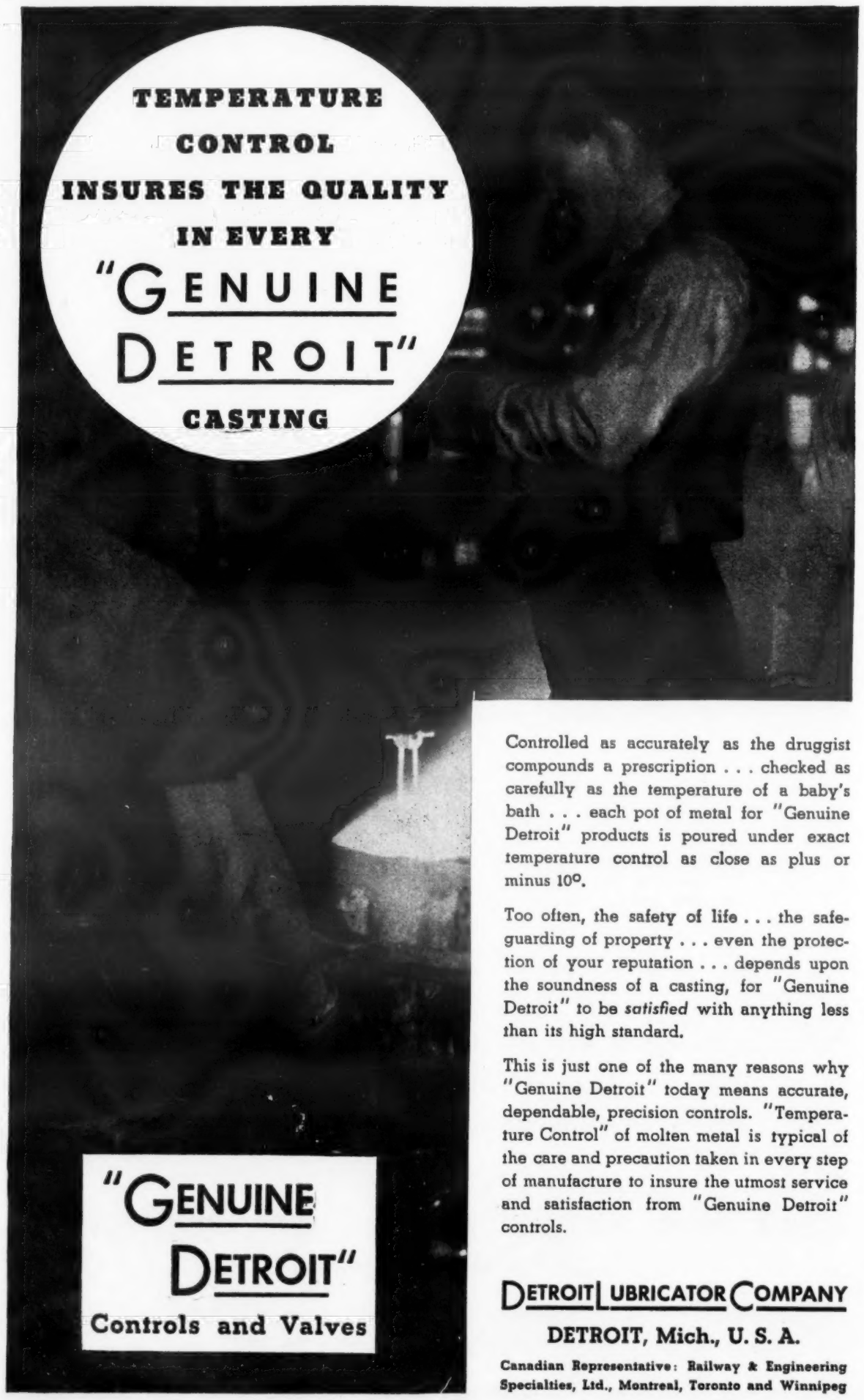
"If water will freeze in contact with rubber as well as with metal," he thought, "and if it can be released easily merely by flexing the rubber, why can't this principle be used for ice cube trays?"

This started a new series of investigations and experiments. The result was the application for a patent, filed May 3, 1928, covering the use of a flexible rubber container in which ice cubes can be frozen and extracted easily and instantly. The patent was duly issued and other patents followed.

GEORGE DWELLEY, who had been sales manager of Kelvinator, became mightily interested in this new device, and assumed responsibility for its sales development.

Soon the Inland Mfg. Co. (manufacturer of these rubber ice trays) had assumed such stature that General Motors began negotiating for the property, and finally acquired it.

The present development of Mr. Copeman's discovery is universally known as the Flexotray (Frigidaire calls it the "Quickube"). Practically all modern automatic refrigerators either furnish them as standard equipment or are prepared to supply them as additional equipment.



Controlled as accurately as the druggist compounds a prescription . . . checked as carefully as the temperature of a baby's bath . . . each pot of metal for "Genuine Detroit" products is poured under exact temperature control as close as plus or minus 10°.

Too often, the safety of life . . . the safeguarding of property . . . even the protection of your reputation . . . depends upon the soundness of a casting, for "Genuine Detroit" to be *satisfied* with anything less than its high standard.

This is just one of the many reasons why "Genuine Detroit" today means accurate, dependable, precision controls. "Temperature Control" of molten metal is typical of the care and precaution taken in every step of manufacture to insure the utmost service and satisfaction from "Genuine Detroit" controls.

DETROIT LUBRICATOR COMPANY

DETROIT, Mich., U. S. A.

Canadian Representative: Railway & Engineering Specialties, Ltd., Montreal, Toronto and Winnipeg

Forced Convection Unit Applied to Cooling Of Combination Meat & Grocery Box

By Arch Black, Refrigerating Engineer, Melchior, Armstrong, Dessau Co.

FOR many years the design of butcher boxes has been unchanged, the conventional bunker arrangement being more or less standard either of the L or V type. Changing an ice system to electric refrigeration many times necessitated certain changes in the baffling, as experience taught, but the amount of space lost for the bunker usually remained. The type of cooling equipment offered to the market has changed as years passed. Ice was replaced with brine tanks of various sizes and shapes. Then came all kinds of finned coils, and each year finds improvements of the non-frost finned coils, with increasing numbers of manufacturers of such coils.

Blower type coils under various trade names have been tried with indifferent success for the past few years, until now this type of unit operates very satisfactorily with several advantages over the finned coil. So successful has the operation of these forced draft units been that there is now a big field in not only new installations, but for replacements.

For this type of unit there are several advantages, such as accessibility, ease of installation, etc., in addition to more uniform relative humidities. Size is very important, since it is not necessary to have as much space used as formerly required for bunkers.

In the manufacture of new commercial boxes, the same provision and meat storage space can be given by smaller boxes, consequently cutting down the outside surface area; lowering cost of manufacture, and above all, lowering operating costs.

In boxes already equipped with bunkers, this space can be utilized in many ways. Removing the bunker entirely, shelves may be built and more space provided for hanging cuts of meat. Fig. 2 shows the conventional bunker arrangement, while Fig. 1 shows an arrangement with considerable merit.

This refrigerator was constructed according to the suggestions of J. Huban, service manager for Economy Grocery Stores.

Having had considerable experience with chain stores, Mr. Huban decided that it would be an advantage if the supply for the butcher were separated from that of the grocer, due undoubtedly to the fact that many times he found that the butcher and grocer were suspicious of each other when it came to shortage of any of their supplies.

Fig. 1 shows a phantom view of a forced draft unit and the box arrangement, with provision for separate locks for the butcher and grocer. Vegetables such as lettuce, celery, spinach, etc., left in the upper portion of the refrigerator on Saturday night may be removed Monday morning in just as fresh a condition as when first put in. This was proven by tests. Mr. Huban estimates that approximately $5 will be saved on vegetables each week by this method.

Referring to Fig. 1 it will be noted that the forced draft unit is placed in one corner and sucks air both from the upper portion of the box and from the lower portion. A small opening in the roof of the lower portion is made at the back of the forced draft unit from which the air is drawn from the upper portion of the box.

In the opposite end there is a small opening through which the cold air flows into the upper portion of the box. This second opening is arranged with a sliding door, so that the size of opening can be varied in order to change the amount of air circulation in the upper portion of the refrigerator.

In tests conducted, the arrangement proved that the upper portion temperature can be kept within 1° F. of the lower portion. Numerous tests have been run with such installations in cooperation with Economy Stores for the past few months, and valuable data obtained as to relative humidities and temperatures.

During the tests recorders were used and definite checks made on temperatures, relative humidities, and running times over long periods, including a condition where the store would be closed over a holiday period, such as Saturday night until Tuesday morning.

Interesting tests were also run where the forced draft unit fan operated continuously and again with a fan economizer switch. This device is merely a reverse acting pressure control. In other words, a standard pressurestat cuts in at high pressures and cuts out at low pressures, while the economizer switch cuts in at the lower pressure and cuts out at a higher pressure.

The exact setting of the pressure control at the condensing unit we found to vary as would best meet the requirements. Test units used sulphur dioxide as the refrigerant, and very good results were obtained in one store with a setting on the pressurestat of 6-in. vacuum cut-out, and 11 lbs. pressure cut-in.

When the economizer fan switch was used it was set to cut in at 2 lbs. and cut out at 8 lbs. Taking these settings as an example, it will be noted that from 11 lbs. to 6-in. vacuum will be the running cycle of the condensing unit, while the running cycle of the fan will be 2 lbs. to 8 lbs.

If we follow a cycle through, it will be found that while the compressor is running the back pressure is gradually lowered, and when it reaches 2 lbs. the fan and compressor run together until a 6-in. vacuum is reached. Then the compressor cuts out and the fan remains running until the suction pressure again builds up to 8 lbs. From 8 lbs. to 11 lbs. neither is running. At 11 lbs. the compressor will again start up leaving the fan off, and so continue the respective cycles.

From this it will be noted there are three periods where either the fan or condensing unit or both run while only one where both items are not operating. Manufacturers vary in opinion as to recommendation regarding continuous operation of the fan.

As to our findings, there are arguments for and against. We point out, however, that with the fan operating continuously the cycle of the condensing unit is somewhat shorter than when the economizer switch is used. However, with the fan cycling it was found that the temperature differential jumped from 2° F. to a 5° to 6° variation.

Consequently the longer cycle has an advantage where the compressor is slightly oversized or where the customer objects to the shorter cycle and is willing to accept the greater temperature difference. In short, the individual requirements will best decide the method.

Forced Convection Installations

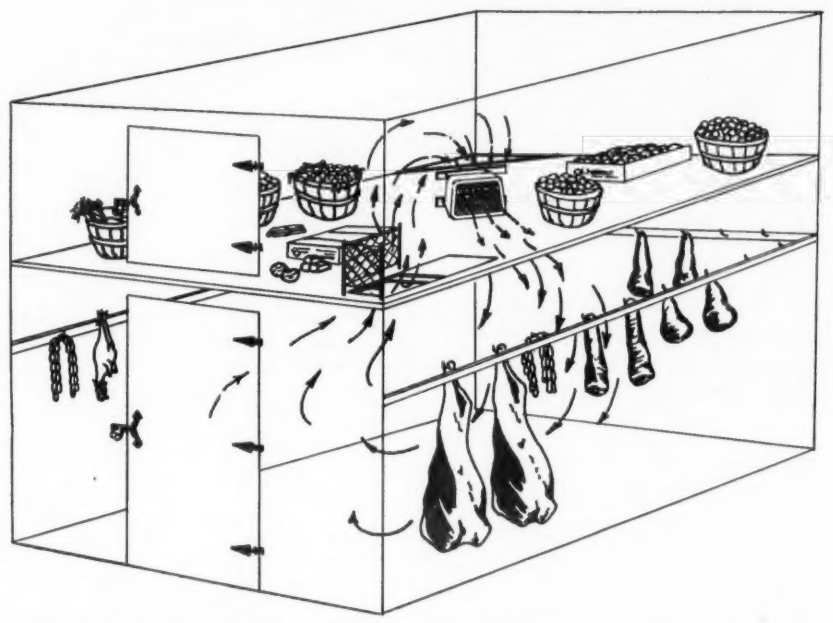


Fig. 1—Forced convection cooling unit installed to cool both butcher and grocery boxes.

Cooler Using Fin Coils

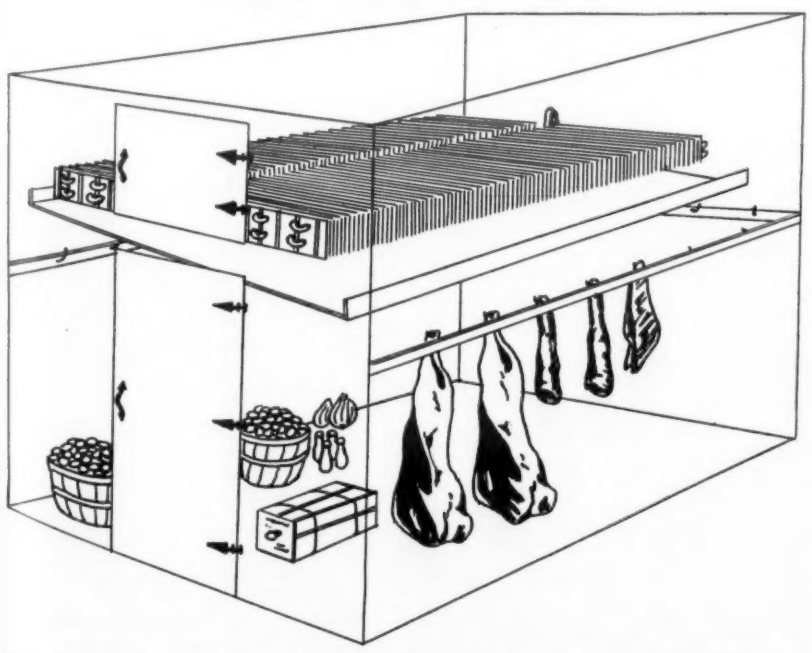


Fig. 2—Bunker type finned coils cooling meat and grocery produce in onerefrigerator.

Frigidaire Man Opens Commercial Showroom

PITTSBURGH — Proper stage setting is important in selling, thinks Al Hattenbach, head of the Suburban Electric Development Co., Frigidaire distributor here, so he has just opened a large showroom and meeting room devoted entirely to Frigidaire commercial equipment.

The room is also used as a meeting place for commercial salesmen.

SPECIFY

ANSUL

SULPHUR DIOXIDE

Pure and bone dry. Every cylinder analyzed. Readily available at 40 warehouses.

METHYL CHLORIDE

Low moisture and acid content assured by laboratory test. Write for complete information and prices.

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Mounting on the Care-free
CAPACITOR-MOTOR

NOW SMOOTH CUSHIONED POWER FOR YOUR REFRIGERATOR

THE 1934 CARE-FREE CAPACITOR-MOTOR is held in a mounting of springy, live rubber which combines excellent sound-isolating qualities with good shaft alignment and mounting flexibility.

This unique mounting is designed to eliminate objectionable noise caused by torque vibration and by endwise and radial out-of-balance. Oil won't injure the rubber, because the rubber is treated with a compound which makes it impervious.

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CAST-ALUMINUM ROTOR — DRIP-PROOF END SHIELDS

To insure unit responsibility for the electric equipment of your refrigerator, order G-E cold-control units, and cable, with the motor. For complete information, address General Electric, Dept. 6A-201, Schenectady, New York.

070-23

GENERAL ELECTRIC

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Ice Cubes

ICE CUBES have played a major role in the drama of selling five million electric refrigerators to American homes. Men have wanted them for their drinks; women have wanted them because they enhanced the appearance of iced tea and water they served at bridge parties and at meal times. And salesmen have capitalized heavily on that desire.

Contrariwise, the common variety of aluminum ice tray has probably been the source of more irritation *to the user* than any other single feature of an electric refrigerator.

It isn't difficult to put a finger on the reason why many of the larger manufacturers stick to the sticking aluminum tray. The Mellon interests and their Aluminum Co. of America, through interlocking directorates, probably see to that. But over some of the smaller, more independent manufacturers, the "big stick" of the aluminum interests does not brandish so menacingly. So we put the question up to one of them—one who is as independent as they come, and who is an engineer to boot—the president of Potter Refrigerator Corp.

Engineering a Compromise

T. Irving Potter was once a laboratory assistant to the late, great Charles Proteus Steinmetz. Years and years ago the Wizard of Schenectady assigned Mr. Potter to the problem of developing an electric refrigerator. And Mr. Potter has been designing refrigerators ever since. Inasmuch as he has no factory, no engineering board, and no corporation affiliations, he can be just about as independent as he pleases when he sets up the specifications for his unique refrigerators.

"Why," we asked Mr. Potter after looking over his three lines of household refrigerators for 1934, "are you using aluminum ice cube trays? Generally they are inclined to stick and refuse to disgorge their load of cubes when time for removal comes."

"Mr. Steinmetz used to tell me," returned Mr. Potter, "that the best engineer was the man who could make the best compromises. And that's my answer to you on the question of ice cube trays. Trays made of copper might have better freezing speeds; on the other hand, the tinning peels and cracks and becomes unsightly after a few years. For quick ejection of cubes we have rubber trays in every model."

Not long ago, on the editorial page of ELECTRIC REFRIGERATION NEWS, there appeared a Fontaine Fox cartoon depicting the Terrible-Tempered Mr. Bang trying to pry loose some sticking ice cube trays with a two-by-four as a lever. Any number of readers have told us that they laughed inordinately at that cartoon. It struck home—because the ordinary aluminum ice tray is one feature of electric refrigerators which is eternally exasperating.

Several solutions for the temper-arousing metal ice tray—which sticks to the freezer and sticks to its cubes—have been devised. For removing trays from the freezer, Frigidaire introduced last year a handle on each tray which, when pulled, acts as a lever and lifts the tray free. This year Potter has a removable lever device which will work a similar operation on any of the ice trays in the box. The Crosley company is furnishing a bottle of liquid—invented by Powel Crosley III—which, when spread on the trays, prevents them from sticking.

A couple of years ago McCord brought out an ingenious ice tray which made easily removable ice bars (prisms); and they followed this up with trays which made cubes in single strips. The McCord trays represent a distinct advance over ordinary metal trays; and although they have perhaps not been pushed as aggressively as their usefulness may have merited, a few manufacturers, including Westinghouse, are now supplying them to their customers.

Rubber Tray Signal Contribution

The rubber tray is now found in almost every electric refrigerator. Invented by Lloyd Copeman in 1928 while on a hunting trip, developed by George Dwelley, and now made and sold in great quantities by the Inland Mfg. Co., the rubber ice tray has been a signal contribution to the industry.

There is one objection to the rubber tray: cubes do not freeze so quickly in it as they do in metal trays. This is the reason most manufacturers cite for including only one rubber tray with each model (some furnish one rubber tray plus a rubber grid for a metal tray; and in a few very large deluxe models two rubber trays may be supplied).

Thus the industry still doesn't seem to have the problem of furnishing an adequate supply of ice cubes quickly and easily entirely solved. Frigidaire talks about the superpower of its two-cylinder compressor, which makes for fast freezing with rubber trays. Potter, by divorcing his freezer from his food-chamber cooling coil, makes the same claim. But the fact remains that no manufacturer has yet advertised that his refrigerator will furnish at all times a full supply of ice cubes frozen quickly, and easily get-at-able. The old aluminum tray, with its stubborn and tenacious grip on the cubes it makes, is still an integral part of all present-day electric refrigerators.

What's the answer? The use of more rubber ice trays with evaporators held at lower temperatures? Mechanical devices for breaking aluminum trays loose from their moorings? Copper trays which can take it? Some new type of tray yet to come from the hands of an inventor? We don't know. But distributors and dealers—and prospects and users—are putting that question up to manufacturers.

And since distributors and dealers, prospects and users, generally get what they ask for, it seems entirely likely that more solutions to the problem of getting ice cubes quickly and conveniently may be expected.

WHAT OTHERS SAY

No Time to Rock the Boat

IT is time to recall the main purpose of the recovery act, which was to stop price chiseling and to spread work and raise wage standards. Business men have never lost sight of this aim, and have labored wholeheartedly to achieve it, regardless of their opinions of the wisdom of the recovery program. So far, labor has been the chief beneficiary of what has been accomplished. Profits have been slow to appear. But business men have not complained; they have been good soldiers.

The same cannot be said of organized labor. It is not satisfied with better wages and improved employment, but demands nation-wide unionization as well. Each successful drive for the closed shop has whetted its appetite for more power. And at this very moment it is training its guns on the great industry that gives promise of leading us out of the depression. It has unleashed strikes at scattered points among automotive plants and has succeeded in fomenting unrest throughout the ranks of motor car workers, notwithstanding that their earnings are the best since 1929.

The situation is ominous, but by no means hopeless. A broad breach of industrial peace can be averted by resolute leadership at Washington. With unprecedented prestige and power, the present Administration can hold labor in check if it will. And if it has the courage to do so it will have the overwhelming support of a depression-worn country. The American people have little sympathy for any class group pursuing a "rule or ruin" policy. They have little patience for those who persist in rocking the boat of recovery as it approaches port.— *The Iron Age*, March 8, 1934.

Potter Refines Two-Compartment Cabinet And Adds New Convenience Features

(Concluded from Page 1, Column 5)

principle by which Potter maintains constant sub-zero temperatures in his ice-freezing compartment, while keeping his food storage compartment at non-dehydrating temperatures.

The first, and lowest priced, of these lines, incorporates a standard evaporator, insulated from the food compartment by dead air held withir an aluminum shroud, and a fin coil for cooling the food storage compartment. The refrigerant passes first through the standard evaporator, and then into the fin coil. Because of the shroud, the low temperatures of the evaporator do not affect the foods stored in the chamber outside—which is kept near 50° F. by the fin coil.

Second line comprises a compartment-within-a-compartment. At the top of, and inside, the food storage compartment is another compartment, running the full width of the cabinet, and closed off by a door. This inner compartment is the ice freezing and cold storage chamber; and is cooled by a plate coil. A fin coil serves the food storage compartment.

Deluxe Cabinets

Third line—the deluxe cabinets—are practically the same refrigerators which Potter offered last year, with two compartment entirely separated from each other. In this cabinet the bottom compartment is the cold storage chamber, and has plate coils. The upper compartment is for ordinary food storage, and is served by a fin coil.

For his first line (the one with the conventional evaporator), Potter is offering a lever device which will pry loose sticking ice trays. Temperatures maintained in the insulated cold storage chambers of his other two lines preclude the formation of frost and the sticking of trays.

Special feature of the 1934 Potter line is the Potter beverage rack, a non-refrigerated compartment in the bottom of the cabinet, and in front of the compressor compartment, which provides storage space for all types of bottled beverages, or for other dry storage. The panel on the front of this compartment swings out from bottom hinges.

The Potter door handle makes available a choice of three opening positions, two vertical and one horizontal, as well as a locked position which makes the interior inaccessible to small children.

Fruit and Vegetable Basket

One of the chief convenience features of the Potter "D" series is a porcelain fruit and vegetable basket with ventilated sides and bottom, which is suspended from the underside of the bottom shelf in the food compartment. It has a 10-qt. capacity. Food compartment shelves are the porcelain type introduced last year by Potter.

Standard on all Potter models is an interior electric light and one rubber ice cube tray.

Models L-5, L-6, and L-7 are equipped with a shrouded conventional type evaporator (plus a fin coil), and have a lacquer exterior finish. These models have semi-concealed hardware, sliding wire basket, egg rack, and beverage rack.

Lacquer Models

Model L-5 has 9.9 sq. ft. of food storage area, freezes 84 cubes at a freezing, and its delivered and installed price is $164. Model L-6 has 11.3 sq. ft. of food storage area, makes 84 ice cubes, and sells for $195. Model L-7 has 14.5 sq. ft. of food storage area, makes 112 ice cubes, and retails at $234.

Models L-104 and L-132 are lacquer finished models with the two-compartment interiors. Their other features are the same as those in the other "L" models.

Model L-104 has a food storage area of 10.4 sq. ft. and a frozen storage compartment with ⅝-bushel capacity. It makes 84 ice cubes at a freezing. Retail price is $229. Model L-132 has 13.2 sq. ft. of food storage area and a frozen storage compartment with ⅝-bushel capacity. It makes 84 ice cubes at a freezing and sells for $272.

The "D" series models have an all-porcelain finish, and the frozen storage compartment below the food storage compartment. The porcelain vegetable storage basket and porcelain shelves are standard on all models in the "D" series.

Model D-100 has 10.3 sq. ft. of food storage area and a 2/5-bushel capacity in the frozen storage compartment. It makes 84 cubes at a freezing and sells for $264.

Model D-130 has 13 sq. ft. of food storage area and 4/5-bushel capacity in the frozen storage compartment. It will make 84 ice cubes at a freezing and sells for $308.

Model D-150 has 15 sq. ft. food storage area and 1¼-bushel capacity in the frozen storage compartment. It will make 112 ice cubes at a freezing and is priced at $369.

Potter advertising and sales promotion this year will center around a "comparison chart" developed by Merchandising Director A. M. Taylor. This chart asks a series of questions which are answered by "yes" in a column under the Potter name, with blank spaces left in the columns for "A" and "B" makes, to be filled out by the prospect.

Comparison Chart

Typical questions in the comparison chart: "Will it preserve the original flavor of all stored foods for 7 to 10 days?" "Does it provide a compartment for the quick chilling of salads and cocktails, as well as the rapid cooling of gelatins, custards, pies, etc.?"

Mats have been prepared for a co-operative dealer newspaper advertising campaign. Mailing pieces and counter sales promotion literature will stress the "comparison chart" theme and the special Potter features. Outdoor posters have been designed to establish in the public mind: (1) the Potter name; (2) the age and reputation of the manufacturer; (3) the unique character of the product; (4) the name and address of the local dealer. Several types of store identification signs are also available.

Among the helps developed for the Potter salesman are the "Health Book," "Floor Presentation," and "Sales Clincher."

The "Health Book," reviewed some time ago in ELECTRIC REFRIGERATION NEWS, delivers a vivid picture of the relation of properly refrigerated food to health. The "Floor Presentation" serves as a guide for handling the prospect in the salesroom, and is based on visual demonstration of the Potter features.

Graphic charts in the "Sales Clincher" enables the salesman to turn every major question and objection raised by the prospect into an effective sales weapon.

One of the most potent pieces of selling ammunition being offered by Potter is contained in a promotion piece titled "Air Conditioning Advances the Domestic Refrigerator." Photographs showing lettuce, macaroni, and custard stored in a Potter are compared with similar items stored in other refrigerators, and text matter points out the part air conditioning plays in food preservation.

Another promotion piece of interest is one titled "Let Potter Owners Tell You What Experience Has Shown Them." This pamphlet relates what Potter users have to say about features of former Potter models.

LETTERS

Photography

W. L. Thompson, Inc.
General Electric Appliances
11 Deerfield St., Boston
March 6, 1934.

Editor:

Although just an employe of this organization, I am an ardent follower of your publication for two good reasons. First, it prints the news, and second, to watch the good results you are obtaining in your photographic work.

I have been meaning to write you for quite a while to ask you how such close-ups under such lighting conditions as you describe are obtained.

What are you using? A Leica with a very fast Zeiss lens on it or something else? I sure would like to know the secret.

Being a fire sparkie I would like to obtain a camera that will do the work like yours will but I am at a loss to know what to do. I have a Graflex now but it is too bulky to be handled easily. I would like to get something I can carry around with me all of the time.

GEORGE E. JOHNSON.

P. S. According to the letters you are receiving you had better start a Camera Club Column in the ELECTRIC REFRIGERATION NEWS.

Editor's Note to the Carl Zeiss, Eastman Kodak, and Folmer Graflex companies: Isn't it about time we received some recognition for our sales promotion efforts in your behalf? Examples: Vincent Lopez (now appearing with his orchestra at Hotel St. Regis, New York) has ordered a complete Zeiss Contax outfit, total cost about $1,000, after seeing pictures the editor of ELECTRIC REFRIGERATION NEWS took of him in action.

Bob Richards of Westinghouse and Gil Baird of Fuller, Smith & Ross have purchased Eastman cameras with fast Zeiss lenses to supply us with pictures. Other publicity men are asking for appropriations for similar purposes.

Another trade paper, *Heating and Ventilating*, may purchase a National (miniature) Graflex as a result of our recommendation.

Flash: Just as we go to press, John Wyllie of Kelvinator calls and asks if he can buy our f2.8 lens, now that we have an f1.5.

SPECIFICATIONS
OF COMMERCIAL REFRIGERATING MACHINES

General Electric
General Electric Co., Nela Park, Cleveland, Ohio

Model No.	CM-4A			CM-4W			CM-5A			CM-5W		
Overall Dimensions (in.)												
Width	22	22	22	27⅞	27⅞	27⅞	31	31	31	36	36	36
Depth	15⅞	15⅞	15⅞	16⅜	16⅜	16⅜	20½	20½	20½	16½	16½	16½
Height	20¼	20¼	20¼	22¼	22¼	22¼	23¾	23¾	23¾	24½	24½	24½
Compressor Specifications												
Displacement, c.f.m.	1.81	2.38	2.65	1.81	2.38	2.65	2.95	3.86	4.77	2.96	3.86	4.77
Compressor speed, r.p.m.	400	525	585	400	525	585	325	425	525	325	425	525
No. of cylinders	2	2	2	2	2	2	2	2	2	2	2	2
Bore (in.)	1¾	1¾	1¾	1¾	1¾	1¾	2	2	2	2	2	2
Stroke (in.)	1⅝	1⅝	1⅝	1⅝	1⅝	1⅝	2½	2½	2½	2½	2½	2½
Motor size (hp.)	⅓	⅓	½	⅓	⅓	⅓	½	¾	1	½	¾	1
Quantity of refrigerant in system (lbs.)	4	4	4	4	4	4	7½	7½	7½	7½	7½	7½
Pump down capacity of receiver (lbs.)	6.5	6.5	6.5	6.5	6.5	6.5	12.6	12.6	12.6	12.6	12.6	12.6
Quantity of oil in system (pts.)	3	3	3	3	3	3	5	5	5	5	5	5

Model No.	CM-6A			CM-6W			CM-8W			CM-10W
Overall Dimensions (in.)										
Width	36	36	36	39	39	39	48	48	48	63¾
Depth	21½	21½	21½	17⅛	17⅛	17⅛	24	24	24	33¾
Height	30⅞	30⅞	30⅞	30⅞	30⅞	30⅞	30⅝	30⅝	30⅝	38⅞
Compressor Specifications										
Displacement, c.f.m.	5.48	7.46	8.95	5.48	7.46	8.95	10.96	12.95	14.92	32
Compressor speed, r.p.m.	275	375	450	275	375	450	275	325	375	275
No. of cylinders	2	2	2	2	2	2	4	4	4	4
Bore (in.)	2½	2½	2½	2½	2½	2½	2½	2½	2½	4
Stroke (in.)	3½	3½	3½	3½	3½	3½	3½	3½	3½	4
Motor size (hp.)	1	1	1½	1	1	1½	2	2	2	10
Quantity of refrigerant in system (lbs.)	14	14	14	14	14	14	20	20	20	40
Pump down capacity of receiver (lbs.)	22.1	22.1	22.1	22.1	22.1	22.1	37.2	37.2	37.2	68
Quantity of oil in system (pts.)	8	8	8	8	8	8	13	13	13	6.5

• • •

Compressor
Type of system .....Conventional
Type of compressor.....Reciprocating
Compressor drive .....V-belt
Type of shaft seal .....Bellows
Cylinder head cooled by.....W models—water; A models—air
Type of lubrication system.....Model CM-10W—forced; others—splash

Condenser & Liquid Receiver
Method of cooling.....A models—air; W models—water
Type of condenser.....A models—finned tube; W models—double tube
Type of liquid receiver.....Horizontal
Has receiver fusible safety plug.....Yes

Motor
Make of motor.....General Electric

Valves
Type of discharge valve .....Reed
Type of suction valve.....Disc

Control
Make of control.....Penn
Type of control .....Pressure
High pressure cut-out.....All models
Condensing water flow controlled by Condensing pressure
Type of overload cut-out.....Thermal

Refrigerant
Kind used.....Sulphur dioxide; CM-10W—Freon only; other models—Freon on special order

Materials Used
Cylinder block .....Semi-steel
Pistons .....Cast iron
Condenser tubes .....Copper

Universal Cooler
Universal Cooler Corp., 7424 Melville Ave., Detroit, Mich.

Model No.	251	332	W332	502	W502	752	W752	1002	W1002
Overall Dimensions (in.)									
Length	24	24	24	29½	29½	29½	29½	36	36
Width	14¼	16	16	18	18	18	18	23½	23½
Height	19¼	19¼	19¼	21½	21½	21½	21½	28	28
Refrigeration Capacity									
In lbs. I.M.E. per 24 hours	113	264	324	423	538	509	643	835	972
Compressor Specifications									
Compressor speed (r.p.m.)	320	320	320	320	360	360	420	275	275
No. of cylinders	1	2	2	2	2	2	2	2	2
Bore (in.)	1.8125	1.8125	1.8125	2.25	2.25	2.25	2.25	2.25	2.25
Stroke (in.)	1½	1½	1½	1½	1½	1½	1½	3	3
Motor size (hp.)	¼	½	½	½	½	¾	¾	1	1
Quantity of refrigerant in system (lbs.)	2½	3½	3½	4	4½	4½	5	8	8
Quantity of lubricant in system (pts.)	¾	3	3	3	3	3	3	6	6

Model No.	1502	W 1502	W 2002	W 2003	W 3003	W 5003	W 7503	W 10003
Overall Dimensions (in.)								
Length	36	36	36½	51	51	51	56	56
Width	23½	23½	23½	23½	23	23¼	28	28
Height	28	28	26½	29	29	29½	35	35
Refrigeration Capacity								
In lbs. I.M.E. per 24 hours	958	1157	1157	2016	2844	4812	8160	9120
Compressor Specifications								
Compressor speed (r.p.m.)	320	400	400	400	480	480	345	400
No. of cylinders	2	2	2	3	3	3	3	3
Bore (in.)	2.25	2.25	2.25	2.5	2.5	3.25	4.0	4.0
Stroke (in.)	3	3	3	3	3	3	4¼	4¼
Motor size (hp.)	1½	1½	2	2	3	5	7½	10
Quantity of refrigerant in system (lbs.)	8	8	8	12	12	12	16	16
Quantity of lubricant in system (pts.)	6	6	8	8	8	9	12	12

• • •

Compressor
Type of system .....Conventional
Type of compressor .....Reciprocating
Compressor drive .....Belt
Type of shaft seal .....Bellows
Cylinder head cooled by.....Water
Type of lubrication system .....Splash

Condenser & Liquid Receiver
Method of cooling .....W models—water; others—air
Type of condenser.....W models—double tube; others—radiator
Type of liquid receiver....Models 251, 332, W332, W752, 1002, W1002—vertical; others—horizontal
Has receiver fusible safety plug....Models 251, 332, W332—no; others—yes

Valves
Type of discharge valve.....Disc
Type of suction valve.....Disc
Type of water valve .....Pressure

Motor
Make of motor.....Wagner or Century

Refrigerant
Kind used.....Methyl chloride or Freon

Control
Make of control.....Detroit Lubricator or Penn
Type of control.....Pressure
High pressure cut-out.....Water cooled models—yes; others—no
Point of operation of cut-out.....175 lbs.
Condensing water flow controlled by Pressure
Type of overload cut-out.....Models 251, 332, W332, 502, W502, 703, W752—fuse; others—thermal cutout

Materials Used
Cylinder block .....Semi-steel
Pistons .....Semi-steel
Condenser tubes .....Copper

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Tabulated on this and the following pages are specifications of 28 makes of commercial refrigerating machines.

Unless otherwise specified, the machines are presumably rated under A.S.R.E. standard conditions (suction pressure corresponding to a saturation temperature of 5° F., discharge pressure corresponding to 86° F.) as was requested in the questionnaire.

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Wurlitzer
The Rudolph Wurlitzer Mfg. Co., North Tonawanda, N. Y.

Model No.	CA33	EA33	FA33	FW33	HA33	HW33	IA33	IW33
Overall Dimensions (in.)								
Width	22¼	24	29½	32½	36	36	36	45
Depth	13¼	18	18	18	23½	23½	23½	23½
Height	16½	20½	21	21	26½	27½	26½	27½
Refrigeration Capacity								
In lbs. I.M.E. per 24 hours	168	240	355	415	653	700	818	979
Compressor speed (r.p.m.)	430	490	540	590	325	...	400	470
No. of cylinders	1	2	2	2	2	2	2	2
Bore (in.)	1¾	1½	1¾	1¾	2½	2½	2½	2½
Stroke (in.)	1¼	1¼	1¼	1¼	1¾	1¾	1¾	1¾
Motor size (hp.)	¼	⅓	½	½	¾	¾	1	1
Quantity refrigerant in system (lbs.)	2	3	3	3	8	8	8	8

Model No.	JA	JW	KW	MW	NW	OW
Overall Dimensions (in.)						
Width	36	36	51	51	56	56
Depth	23½	23½	23	23¼	28	28
Height	26½	27½	29	29½	35	35
Refrigeration Capacity						
In lbs. I.M.E. per 24 hours	1020	1392	2016	4812	8160	9120
Compressor speed (r.p.m.)	540	660	400	480	345	400
No. of cylinders	2	2	3	3	3	3
Bore (in.)	2½	2½	2½	3¼	4	4
Stroke (in.)	1¾	1¾	3	3	4¼	4¼
Motor size (hp.)	...	1½	2	5	7½	10
Quantity refrigerant in system (lbs.)	8	8	12	12	16	16

• • •

Compressor
Type of system.....Conventional
Type of compressor.....Reciprocating
Compressor drive .....V-belt
Type of shaft seal.....Bellows
Type of lubrication system.....Splash

Condenser & Liquid Receiver
Method of cooling.....W models—water; A models—air
Type of condenser.....W models—double tube; A models—air
Type of liquid receiver.....Horizontal
Has receiver fusible safety plug.....Yes

Motor
Make of motor .....Wagner

Valves
Type of discharge valve.....Disc
Type of water valve.....Pressure

Control
Make of control.....Tagliabue, Penn, Detroit Lubricator
Type of control...Pressure or temperature
Condensing water flow controlled by Automatic water valve
Type of overload cut-out.....In starting switch
Type of high pressure cut-out.....Dual control
Point of operation of high pressure cut-out .....150 lbs.

Refrigerant
Kind used .....Methyl chloride

Materials Used
Cylinder block .....Cast iron
Pistons .....Cast iron
Condenser tubes .....Copper
Condenser shell .....Copper

We ask for no higher tribute to our manufacturing ability than to have people say, "Universal Cooler products are good products—you can always depend upon them". It is gratifying to us to hear how generally this sentiment is expressed.

UNIVERSAL COOLER CORPORATION
DETROIT, MICHIGAN — BRANTFORD, ONTARIO

MANUFACTURERS OF A COMPLETE LINE OF HOUSEHOLD AND COMMERCIAL REFRIGERATION EQUIPMENT

Kelvinator

Kelvinator Corp., Detroit, Mich.

Model No.	B 325H	B 333H	WB 333H	G 350H	WG 350H	F 375	WF 375	F 3100	WF 3100
Overall Dimensions (in.)									
Width	19⅜	21⅜	21⅜	22⅝	22⅝	38¾	37⅝	38¾	37⅝
Depth	16	17	20	18½	15⅝	21⅜	18	21⅜	18
Height	15¾	17⅝	17½	19⅜	19⅜	25	25	25	25
Refrigeration Capacity									
In lbs. I.M.E. per 24 hours	237	326	383	528	555	695	822	938	1082
Compressor Specifications									
Compressor speed (r.p.m.)	465	640	725	575	640	400	490	490	600
No. of cylinders	2	2	2	2	2	2	2	2	2
Bore (in.)	1¼	1¼	1¼	1½	1½	1-13/16			
Stroke (in.)	1½	1½	1½	1¾	1¾	2½	2½	2½	2½
Motor size (hp.)	¼	⅓	⅓	½	½	¾	¾	1	1
Quantity of refrigerant in system (lbs.)	3	3½	3½	4	4	6	6	6	6
Pump down capacity of receiver (lbs.)	5.8	6.4	6.4	13.4	8.4	22.0	14.0	22.0	14.0
Quantity of lubricant in system (lbs.)	1.625	1.625	1.625	2.0	2.0	2.25	2.25	2.25	2.25

Model No.	R 3150	WR 3150	R 3200	WR 3200	WQ 3300	WQ 3500H	B 125H	G 133H	WG 133H
Overall Dimensions (in.)									
Width	40¾	39⅝	40¾	39⅝	50	70	19⅜	21⅜	21⅜
Depth	22	18	22	20¾	24⅝	25½	16	17	16⅜
Height	26⅝	26⅝	26⅝	26¾	25½	32	15¾	17¾	17¾
Refrigeration Capacity									
In lbs. I.M.E. per 24 hours	1291	1566	1940	2240	3130	4810	200	322	341
Compressor Specifications									
Compressor speed (r.p.m.)	330	400	490	550	400	590	640	575	640
No. of cylinders	2	2	2	2	4	4	2	2	2
Bore (in.)	2¼	2¼	2¼	2¼	2¼	2¼	1¼	1½	1½
Stroke (in.)	3½	3½	3½	3½	3½	3½	1½	1¾	1¾
Motor size (hp.)	1½	1½	2	2	3	5	¼	⅓	⅓
Quantity of refrigerant in system (lbs.)	8	8	8	8	15	15	4	5	5
Pump down capacity of receiver (lbs.)	22.0	14.0	22.0	15.0	28.0	47.0	8.7	10.6	10.6
Quantity of lubricant in system (lbs.)	3.375	3.375	3.375	3.375	8.0	8.0	1.625	2.0	2.0

Model No.	F 150H	WF 150H	F 175	WF 175	R 1100	WR 1100	R 1150	WR 1150	WQ 1200	WQ 1300
Overall Dimensions (in.)										
Width	29⅜	30⅝	38¾	37⅝	40¾	39⅝	40¾	39⅝	50	50
Depth	18⅞	15⅝	21⅜	18	22	18	22	20¾	24⅝	24⅝
Height	21½	21½	25	25	26⅝	26⅝	26⅝	26¾	25½	25½
Refrigeration Capacity										
Lbs. I.M.E. per 24 hrs.	530	541	645	658	875	1050	1298	1442	2100	2570
Compressor Specifications										
Compressor speed (r.p.m.)	450	485	540	600	330	400	490	550	400	490
No. of cylinders	2	2	2	2	2	2	2	2	4	4
Bore (in.)	1-13/16				2¼	2¼	2¼	2¼	2¼	2¼
Stroke (in.)	2½	2½	2½	2½	2½	3½	3½	3½	3½	3½
Motor size (hp.)	½	½	¾	¾	1	1	1½	1½	2	3
Quantity of refrigerant in system (lbs.)	6	6	8	8	8	8	12	12	12	20
Pump down capacity of receiver (lbs.)	24	15	34	21	34	21	34	23	37	41
Quantity of lubricant in system (lbs.)	2.25	2.25	2.25	2.25	3.375	3.375	3.375	3.375	8.0	8.0

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Control
Make of control.....¼ H.P. models—Ranco; others—Kelvinator
Type of control...Pressure or temperature
High pressure cut-out.....On all models except ¼ H.P. units
Point of operation of cut-out.....135 lbs.

Compressor
Type of system .....Conventional
Type of compressor.....Reciprocating
Compressor drive .....Belt
Type of shaft seal .....Bellows
Cylinder head cooled.....Air cooled on ¼ hp. models; W models—water; others—refrigerant
Type of lubrication system.....Splash

Valves
Type of discharge valve.....Reed
Type of suction valve.....Reed
Type of water valve.....Diaphragm

Condenser & Liquid Receiver
Method of cooling.....W models—water; others—air
Type of condenser.....Water-cooled models—spiro-coil; air-cooled models—finned tube
Condensing water flow controlled by Head pressure
Type of overload cut-out.....Thermal

Materials Used
Cylinder block .....Cast iron
Pistons .....Cast iron
Condenser tubes .....Copper
Condenser shell .....Steel
Type of liquid receiver.....Models designated by letter "H" have horizontal receivers; others—vertical

Refrigerant
Kind used.....Series 1—sulphur dioxide; series 3—methyl chloride

Frigidaire

Frigidaire Sales Corp., Dayton, Ohio

Model No.	AA 120	A 125	AB 133	A 233	A 375	A 4100	A 5150	W 233	W 350	W 475
Overall Dimensions (in.)										
Width	19⅞	20¾	20¾	31¼	32½	37	40	33¼	33¼	37
Depth	15	15⅝	17	17¼	21	21¼	24	19¼	19¼	19¼
Height	13⅝	13⅝	13⅝	19½	22	22	26	20	20	22
Refrigeration Capacity										
In lbs. I.M.E. per 24 hours	193	234	296	410	765	1145	1480	463	645	1000
Compressor Specifications										
Compressor speed (r.p.m.)	375	455	580	310	380	475	425	350	380	415
No. of cylinders	2	2	2	2	2	2	2	2	2	2
Bore (in.)	1½	1½	1½	1⅞	2⅛	2⅛	2½	1⅞	2⅛	2⅛
Stroke (in.)	1-7/16	1-7/16	1-7/16	2⅝	2⅝	3¼	3½	2⅜	2⅝	3¼
Motor size (hp.)	⅛	¼	⅓	⅓	½	1	1½	⅓	½	¾
Quantity of refrigerant in system (lbs.)	2	3	3	3	3	3½	4	3	3	3½
Pump down capacity of receiver (lbs.)	6.8	13.9	13.9	19.0	21.5	23.5	35.0	21.5	21.5	23.5
Quantity of lubricant in system (lbs.)	1¼	1¼	1¼	3½	3½	4	4	3½	3½	4

Model No.	W 5100	W 6150	FW 4151	*FW 4152	FW 6200	FW 6300	FW 7500	FW 7750	FW 71000
Overall Dimensions (in.)									
Width	40	42½	40	40	42½	42½	54½	54½	54½
Depth	21	22½	21	21¾	22½	22½	32	32	32
Height	25	33¼	24½	24½	33¼	33¼	34½	34½	34½
Refrigeration Capacity									
In lbs. I.M.E. per 24 hours	1480	1860	1450	1450	2520	3100	5900	9400	10800
Compressor Specifications									
Compressor speed (r.p.m.)	425	535	360	360	535	535	360	575	660
No. of cylinders	2	2	2	2	2	2	4	4	4
Bore (in.)	2½	2½	2⅛	2¼	2½	2½	3⅛	3⅛	3⅛
Stroke (in.)	3½	3½	3¼	3¼	3½	3½	3⅛	3⅛	3⅛
Motor size (hp.)	1	1½	1½	1½	2	3	5	7½	10
Quantity of refrigerant in system (lbs.)	4	8	12	12	8	8	8	15	15
Pump down capacity of receiver (lbs.)	35.0	56.0	35.0	35.0	56.0	56.0	65.0	130.0	130.0
Quantity of lubricant in system (lbs.)	4	4	4	4	4	4	8	8	8

Compressor
Type of system .....Conventional
Type of compressor .....Reciprocating
Compressor drive .....Belt
Type of shaft seal .....Bellows
Cylinder head cooled by.....A models & models FW7500, FW7750, & FW71000—air; others—water
Type of lubrication system.....Models FW7500, FW7750, & FW71000—forced; others—splash

Condenser & Liquid Receiver
Method of cooling.....A models—air; W models—water
Type of condenser.....A models—finned tube; W models—double tube
Type of liquid receiver.....Horizontal
Has receiver fusible safety plug....Models FW7500, FW7750, & FW71000—yes; others—no

Materials Used
Type of water valve.....Pressure
Cylinder block .....Cast iron
Pistons .....Cast iron
Condenser tubes .....Models FW7500, FW7750, & FW71000—brass; others—copper
Condenser shell .....Steel

Motor
Make of motor .....Delco

Refrigerant
Kind used....FA & FW models—Freon; others—sulphur dioxide

Control
Make of control .....Frigidaire
Type of control...Pressure or temperature
High pressure cut-out.....All models
Point of operation of high pressure cut-out .....Models FW7500, FW7750, & FW71000—185 lbs.; others, when using SO_2—135 lbs.
Condensing water flow controlled by Head pressure
Type of overload cut-out.....Thermal
Type of discharge valve..FW7500, FW7750, & FW71000—ring; others—steel spring
Type of suction valve....FW7500, FW7750, & FW71000—ring; others—disc

Special Features
Model FW4152 is fitted with a water-cooled fin coil in addition to the condenser, so that the condensing unit may be operated in a small enclosure.

Gibson

Gibson Electric Refrigerator Corp., Greenville, Mich.

Model No.	G251	G332 G332W	G502 G502W	G752	G752W	G1002 G1002W
Overall Dimensions (in.)						
Width	24	24	29½	29½	36	36
Depth	14¼	16	18	18	23½	23½
Height	19¼	19¼	21½	21½	28	28
Refrigeration Capacity						
In lbs. I.M.E. per 24 hours	113	264	324	423	538	509	643	835	972
Compressor Specifications						
Compressor speed (r.p.m.)	320	320	320	320	360	360	430	275	275
No. of cylinders	1	2	2	2	2	2	2	2	2
Bore (in.)	1.8125	1.8125	1.8125	2.25	2.25	2.25	2.25	2.25	2.25
Stroke (in.)	1½	1½	1½	1½	1½	1½	1½	3	3
Motor size (hp.)	¼	⅓	⅓	½	½	¾	¾	1	1
Quantity of refrigerant in system (lbs.)	2	3½	3½	4	4½	4½	5	8	8
Quantity of lubricant in system (pts.)	¾	3	3	3	3	3	3	6	6

Model No.	G1502	G1502W G2002W	G2003W G3003W	G5003W G7503W	G10003W
Overall Dimensions (in.)					
Width	36	36	36½	51	51	51	56	56
Depth	23½	23½	23½	24½	23	23¼	28	28
Height	28	28	26½	29	29	29½	35	35
Refrigeration Capacity						
In lbs. I.M.E. per 24 hours	958	1157	1157	2016	2844	4812	8160	9120
Compressor Specifications						
Compressor speed (r.p.m.)	320	400	400	400	480	480	345	400
No. of cylinders	2	2	2	3	3	3	3	3
Bore (in.)	2.25	2.25	2.25	2.5	2.25	3.25	3.0	3.0
Stroke (in.)	3	3	3	3	3	3	4	4
Motor size (hp.)	1½	1½	2	2	3	5	7½	10
Quantity of refrigerant in system (lbs.)	8	8	8	12	12	14	17½	17½
Quantity of lubricant in system (pts.)	6	6	6	8	8	9	12	12

Compressor
Type of system .....Conventional
Type of compressor .....Reciprocating
Compressor drive .....Belt
Type of shaft seal.....Bellows
Cylinder head cooled by....Models W2003, W3003, W5003—water; others—air
Type of lubrication system.....Splash

Refrigerant
Kind used.....Models G7503W & G10003W —Freon; others—methyl chloride

Condenser & Liquid Receiver
Method of cooling.....W models—water; others—air
Type of condenser.....W models—double tube; others—radiator
Type of liquid receiver....Models 251, 332, W752, 1002, W1002 —vertical; others—horizontal
Has receiver fusible safety plug....Models 251, 332, W332—no; others—yes

Motor
Make of motor .....Wagner

Valves
Type of discharge valve.....Disc
Type of suction valve.....Disc
Type of water valve.....Pressure

Control
Make of control.....Tagliabue or Penn
Type of control.....Pressure
High pressure cut-out.....All models
Point of operation of cut-out.....150 lbs.
Condensing water flow controlled by Pressure
Type of overload cut-out.....Models 251, 332, W332, 502, W502, 703, W752—fuse; others—thermal cutout

Materials Used
Cylinder block .....Semi-steel
Pistons .....Semi-steel
Condenser tubes .....Copper

"It's the motor, so the service man says—"

"Why, Evelyn! How nervous and excited you are! Something's happened to you."

"Jane, my refrigerator is out of order—and it had to happen today when the Club meets at my house."

"That's too bad, Evelyn. What can I do to help you?"

"Can you let me have some ice cubes, Jane? I just hate to make myself a nuisance again. The service man is in the kitchen now."

"What seems to be the trouble?"

"Oh, it's the motor, so the service man says . . ."

And so on! just another example of what motor trouble means. A dissatisfied customer broadcasting her troubles.

There is a sure cure for troublesome motors. Replace them with Wagner motors.

Whether it is a refrigerator, or an oil-burner, or a stoker—whatever the appliance involved, there's a Wagner motor ideally suited to operate it to your customers' satisfaction.

S534-1

Wagner Electric

6400 Plymouth Ave.
St. Louis, U. S. A.

MOTORS | TRANSFORMERS | FANS | BRAKES

Vilter

Vilter Mfg. Co., Milwaukee, Wis.

Model No.	3F-A	3F-W	5F-A	5F-W	7F-A	7F-W
Overall Dimensions (in.)						
Width	18	20	18	20	18	20
Depth	30	30	30	30	33	34
Height	18	18	19	18	20	20
Refrigeration Capacity						
In B.t.u.'s per hour*	2180	2310	3320	3530	4968	5292
Compressor Specifications						
Compressor speed (r.p.m.)	525	525	800	800	1200	1200
No. of cylinders	1	1	1	1	1	1
Quantity of refrigerant in system (lbs.)	5	5	5	5	6	6
Motor size (hp.)	⅓	⅓	½	½	¾	¾
Quantity of lubricant in system (lbs.)	1	1	1	1	1	1

Model No.	10F-A	10F-W	15F-A	15F-W	20F-A	20F-W	30F
Overall Dimensions (in.)							
Width	20	22	24	26	24	26	28
Depth	33	33	40	42	40	42	48
Height	22	22	24	24	26	26	32
Refrigeration Capacity							
In B.t.u.'s per hour*	6870	7320	10750	11200	14100	14700	22620
Compressor Specifications							
Compressor speed (r.p.m.)	1150	1150	800	800	1050	1050	1000
No. of cylinders	1	1	1	1	1	1	1
Quantity of refrigerant in system (lbs.)	6	6	12	12	12	12	12
Motor size (hp.)	1	1	1½	1½	2	2	3
Quantity of lubricant in system (lbs.)	2	2	3	3	3	3	4

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Compressor
Type of system.....Conventional
Type of compressor.....Rotary
Compressor drive.....V-belt
Type of shaft seal.....Metal-to-metal & packing
Cylinder head cooled by.....Oil
Type of lubrication system.....3F, 5F, 7F, and 10F series—splash; others—forced

Condenser & Liquid Receiver
Mehtod of cooling.....A models—air; W models and 30-F—Water
Type of condenser.....A models—radiator type; W models and 30-F—double tube
Type of liquid receiver.....Horizontal
Has receiver fusible safety plug.....No

Control
Make of control.....Penn
Type of control.....Suction pressure
Condensing water flow controlled by.....Discharge pressure
Type of overload cut-out.....Thermal

Refrigerant
Kind used.....Methyl chloride, Freon, or ammonia

Valves
Type of discharge valve.....Feather
Type of water valve.....Penn

Materials Used
Cylinder block.....Semi-steel
Rotor .....Steel
Condenser tubes .....Copper
Condenser shell .....Steel

Special Features
Three moving parts, all oil-cooled.

*Ratings given in B.t.u.'s per hour with methyl chloride as refrigerant. Following conditions used in arriving at ratings: 20° F. evaporator tempertature, with 100° F. condensing temperature with air-cooled models, and 86° F. condensing temperature with water-cooled models.

Curtis

Curtis Mfg. Co., St. Louis, Mo.

Model No.	SAR 16-B	SAR 25-C	MAR 25-J	MAH 25-E	MAL 25-J	MAR 33-K	MAL 33-L	MAR 33-L	MAH 33-L	MWR 33-L
Overall Dimensions (in.)										
Width	15⅝	16⅜	15¼	15¼	14⅞	15¾	14⅞	16	18	19½
Length	23⅛	23⅛	23½	23½	17¾	24	18¼	29	30½	28¼
Height	11¼	12	17½	17½	22¾	17⅜	22¾	20¾	24	24
Refrigeration Capacity										
Lbs. I.M.E. per 24 hrs.	119	194	217	187	247	277	434	327	302	376
Compressor Specifications										
Compressor speed r.p.m.	470	490	350	400	400	350	375	350	325	375
No. of cylinders	1	1	1	1	1	1	2	2	2	2
Bore (in.)	1½	1⅞	1⅞	1⅝	1⅞	2⅛	1⅝	1⅝	1⅝	1⅝
Stroke (in.)	1½	1½	1⅝	1⅝	1⅝	1⅝	1⅝	1⅝	1⅝	1⅝
Motor size (hp.)	⅛	¼	¼	¼	¼	⅓	⅓	⅓	⅓	⅓
Quantity of refrigerant in system (lbs.)	2	3	4	4	3	5	3	5	8	6
Pump down capacity of receiver (lbs.)	6.5	6.5	8.25	8.25	6.5	8.25	6.5	8.25	21.0	21.0
Quantity of lubricant in system (lbs.)	⅝	⅞	1¼	1¼	1¼	1¼	2¾	2¾	2¾	2¾

Model No.	MAR 50-N	MWR 50-N	MAR 75-O	MWR 75-O	MAR 100-P	MWR 100-P	MAR 150-Q	MWR 150-Q	MAR 200-Q	MAG 100-N	MAG 300-Q
Overall Dimensions (in.)											
Width	18	19½	18½	20	20	22½	23½	24½	24	23¾	32¼
Length	30½	28¼	29½	28¼	36½	34	35½	38¼	36½	29½	32½
Height	24	23¾	25½	24	26½	26¼	27	26¼	28	19½	23¼
Refrigeration Capacity											
In lbs. I.M.E. per 24 hours	464	562	720	850	1025	1150	1415	1510	1600	464	1162
Compressor Specifications											
Compressor speed (r.p.m.)	375	425	425	500	400	450	400	425	450	375	350
No. of cylinders	2	2	2	2	2	2	2	2	2	2	2
Bore (in.)	1⅞	1⅞	2⅛	2⅛	2⅛	2⅛	2½	2½	2½	1⅞	2½
Stroke (in.)	1⅝	1⅝	1⅝	1⅝	2½	2½	2½	2½	2½	1⅝	2½
Motor size (hp.)	½	½	¾	¾	1	1	1½	1½	2	1	3
Quantity of refrigerant in system (lbs.)	6	6	6	6	8	8	8	8	10	5	5
Pump down capacity of receiver (lbs.)	21.0	21.0	21.0	21.0	29.0	29.0	29.0	29.0	29.0	8.25	17.0
Quantity of lubricant in system (lbs.)	2¾	2¾	2¾	2¾	4¼	4¼	4¼	4¼	4¼	2¾	4¼

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Compressor
Type of system.....Conventional
Type of compressor.....Reciprocating
Compressor drive.....Belt
Type of shaft seal.....Bellows
Cylinder head cooled by.....Models MWR-100-P & MWR-150-Q—water; others—air
Type of lubrication system.....Controlled splash

Refrigerant
Kind used.....S models—sulphur; M models—methyl

Condenser & Liquid Receiver
Method of cooling...MWR models—water; others—air
Type of condenser.....MWR models—double tube; others—finned tube

Motor
Make of motor.....Wagner or equal

Valves
Type of discharge valve.....Wafer
Type of suction valve.....Wafer
Type of water valve.....Penn

Materials Used
Cylinder block.....Semi-steel
Pistons.....Semi-steel
Condenser tubes.....Copper

Control
Make of control.....Penn
Type of control.....Pressure
High pressure cut-out...Models MAH-33-L & larger—yes; others—no
Condensing water flow controlled by.....Head pressure
Type of overload cut-out.....Thermal

Servel

Servel Sales, Inc., Evansville, Ind.

Model No.	14A	19A	30D	40AW	50D	50DW	75C	75EW
Overall Dimensions (in.)								
Width	20	19⅝	27	27½	31½	31½	31½	31½
Depth	15	16½	16½	18¼	21½	21½	21½	21½
Height	18	13½	19	20	22½	22½	22½	22½
Refrigeration Capacity								
In lbs. I.M.E. per 24 hours	94	165	344	375	465	580	710	865
Compressor Specifications								
Compressor speed (r.p.m.)	430	425	410	450	270	310	435	475
No. of cylinders	1	1	2	2	2	2	2	2
Bore (in.)	1⅝	1⅝	1⅝	1⅝	2⅛	2⅛	2⅛	2⅛
Stroke (in.)	1-7/16	1⅝	1⅝	1⅝	2	2	2	2
Size of motor (hp.)*	⅛	¼	⅓	½	½	½	¾	¾
Pump down capacity of receiver (lbs.)	2	3	5½	5½	6½	6½	6½	6½
Quantity of lubricant in system (pts.)	1	1	2	2	4	4	4	4

Model No.	100 C	100 EW	150 A	150 BW	200 A	200 BW	500 AW	700 AW
Overall Dimensions (in.)								
Width	39	39½	39	39½	38¾	38¾	48	48
Depth	24	24	24½	25½	27¼	26½	27	27
Height	25½	26	25½	26	26¼	25¾	60	60
Refrigeration Capacity								
In lbs. I.M.E. per 24 hours	1110	1115	1450	1450	2020	2020	5300	7570
Compressor Specifications								
Compressor speed (r.p.m.)	355	355	475	485	475	485	500	700
No. of cylinders	2	2	2	2	3	3	2	2
Bore (in.)	2¼	2¼	2¼	2¼	2¼	2¼	3¾	3¾
Stroke (in.)			2-13/16				3¾	3¾
Size of motor (hp.)*	1	1	1½	1½	2	2	5	7½
Pump down capacity of receiver (lbs.)	18	18	18	18	18	18	55	55
Quantity of lubricant in system (pts.)	8	8	8	8	10	10	16	16

* * *

Compressor
Type of system.....Conventional
Type of compressor.....Reciprocating
Compressor drive.....Belt
Type of shaft seal.....Bellows
Cylinder head cooled by....Models AW, EW & BW—water; others—air
Type of lubrication system....Models 500 & 700—forced feed; others—splash

Condenser & Liquid Receiver
Method of cooling.....A, C, & D models—air; AW, EW, & DW—water
Type of condenser.....A, C, & D models—radiator; AW, BW, DW, & EW models—concentric tube
Type of liquid receiver....Models 500 & 700—vertical; others—horizontal
Has receiver fusible safety plug.....No

Valves
Type of discharge valve.....Disc
Type of suction valve.....Flapper**
Type of water valve..Condensing pressure

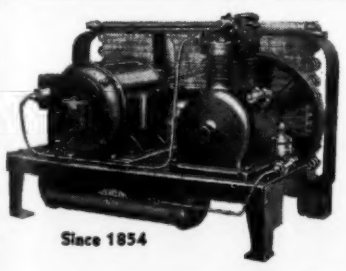
Control
Make of control.....Model 14A—Bishop & Babcock; others—Penn
Type of control...Pressure or temperature
High pressure cut-out.....Models 40AW, 50DW, 75EW, 100C, 100EW, 150A, 150BW, 200A, & 200BW
Point of operation of cut-out....AW, BW, DW, EW models—125 lbs.; others—160 lbs.
Condensing water flow controlled by.....Condensing pressure
Type of overload cut-out.....Thermal

Motor
Make of motor.....Wagner

Refrigerant
Kind used.....Methyl chloride

Materials Used
Cylinder block.....Semi-steel
Pistons.....Semi-steel
Condenser tubes.....Copper

*All models available with the motor one size larger.
**Disc on Models 500 & 700.



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CURTIS MANUFACTURING COMPANY
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518 H Hudson Terminal, New York City.

York

York Ice Machinery Corp., York, Pa.

Model No.	422 FW	424 FW	426 FW	428 FW	422 FW	444 FW
Overall Dimensions (in.)						
Width	33	33	35	35	44	44¾
Depth	16¾	16¾	18	18	23¾	24½
Height	28	28	29	29	41½	43½
Compressor Specifications						
Compressor speed (r.p.m.)	375	500	375	500	265	330
No. of cylinders	2	2	2	2	2	2
Bore (in.)	2⅝	2⅝	2⅝	2⅝	4	4
Stroke (in.)	1¼	1¼	2½	2½	3	4
Motor size (hp.)	¾	1	1½	2	3	5
Quantity of refrigerant in system (lbs.)	7	7	7	7	14	14
Quantity of lubricant in system (qts.)	3	3	3	3	10	10

Model No.	412 FA	414 FA	416 FA	418 FA	422 FA	424 FA	426 FA
Overall Dimensions (in.)							
Width	21¼	21¼	26	26	36¼	36¼	36¼
Depth	16½	16½	19	20	23¼	25¼	26¼
Height	17½	17½	17¾	17¾	26¼	26¼	26¼
Compressor Specifications							
Compressor speed (r.p.m.)	450	550	350	500	400	300	400
No. of cylinders	2	2	2	2	2	2	2
Bore (in.)	1¾	1¾	1¾	1¾	2⅝	2⅝	2⅝
Stroke (in.)	⅞	⅞	1¾	1¾	1¼	2½	2½
Motor size (hp.)	¼	½	½	¾	1	1½	2
Quantity of refrigerant in system (lbs.)	3	3	4	4	9½	9½	9½
Quantity of lubricant in system (qts.)	1¼	1¼	1¼	1¼	3	3	3

* * *

Compressor
Type of system.....Conventional
Type of compressor.....Reciprocating
Compressor drive.....Belt
Type of shaft seal.....York Balanseal
Cylinder head cooled by.....Air
Type of lubrication system....Centri-force & splash

Condenser & Liquid Receiver
Method of cooling.....W models—water; A models—air
Type of condenser.....W models—shell & coil; A models—finned tube
Has receiver fusible safety plug.....Yes
Type of liquid receiver.....Horizontal

Refrigerant
Kind used.....Freon

Motor
Make of motor.....Century

Materials Used
Cylinder block.....Nickel iron
Pistons.....Nickel iron
Condenser tubes.....Copper
Condenser shell.....Steel

Control*
Make of control....Minneapolis-Honeywell
Type of control.....Pressure
High pressure cut-out.....On all models
Point of operation of cut-out.....185 lbs.
Condensing water flow controlled by.....Condensing pressure
Type of overload cut-out.....Thermal

Valves
Type of discharge valve.....Disc
Type of suction valve.....Disc
Type of water valve.....Penn

*On ⅛, ¼, ½, ¾ FA units no relay starter or cut-out switch.

Westinghouse

Westinghouse Electric & Mfg. Co., Mansfield, Ohio

Model No.	AS12	AS25	AS50	ASW50
Overall Dimensions (in.)				
Width	18⅜	18¾	18½	18½
Depth	18⅜	23⅞	30	30
Height*	17	17	27¼	27¼
Refrigeration Capacity				
In lbs. I.E.M. per 24 hours	96	192	384	384
Compressor Specifications				
Compressor speed (r.p.m.)	1750	1750	1750	1750
No. of cylinders	1	2	4	4
Bore (in.)	1	1	1	1
Stroke (in.)	⅞	⅞	⅞	⅞
Motor size (hp.)	⅛	¼	½	½
Quantity of refrigerant in system (lbs.)	2½	4	8	8
Quantity of lubricant in system (lbs.)	2	2½	5¾	5¾

Compressor
Type of system.....Hermetic
Type of compressor.....Reciprocating
Compressor drive.....Direct
Cylinder head cooled by..Refrigerant gas
Type of lubrication system.....Splash

Motor
Make of motor.....Westinghouse

Condenser & Liquid Receiver
Method of cooling.....W model—water; others—air
Type of condenser.....W model—double tube; others—radiator
Type of liquid receiver.....Horizontal
Has receiver fusible safety plug.....Yes

Refrigerant
Kind used.....Sulphur dioxide

Control
Make of control.....Westinghouse
Type of control.....Temperature
High pressure cut-out.....All models
Point of operation of cut-out.....180 lbs.
Type of overload cut-out.....Spencer thermostat

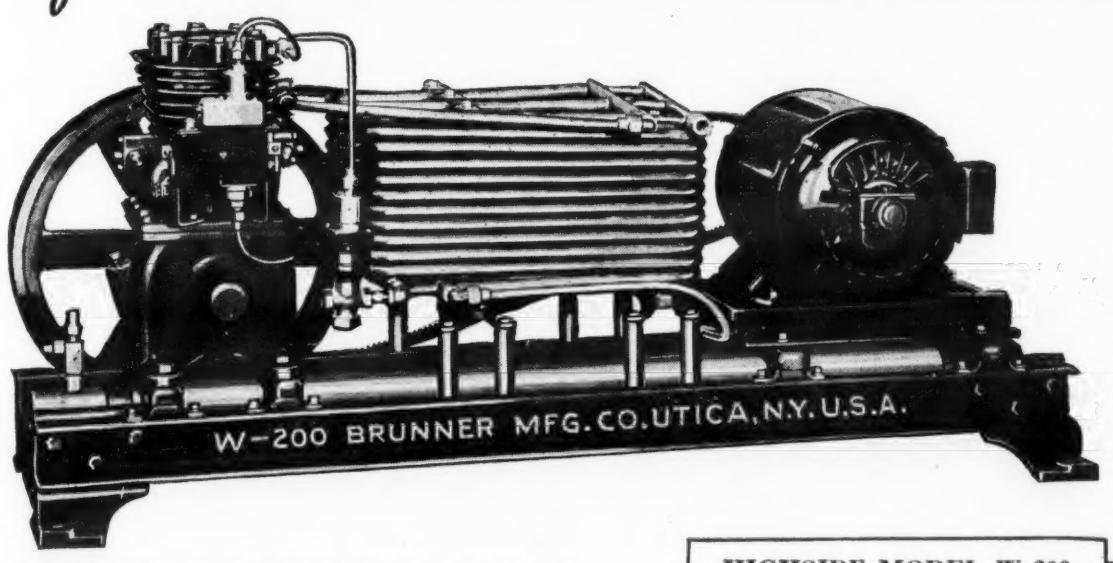
Valves
Type of discharge valve.....Flapper
Type of suction valve.....Flapper

Materials Used
Cylinder block.....Semi-steel
Pistons.....Nytrided tool steel
Condenser tubes.....Copper

*Includes 5¾ in. legs which can be removed.

Two New

BRUNNER HIGHSIDES



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HIGHSIDE MODEL W-200

Very popular on large soda fountain applications, using ice cream freezers up to 5 gallon capacity.

Extremely efficient on limited air-conditioning applications requiring up to 2 tons of refrigeration.

HIGHSIDE MODEL W-300

A heavy duty 2-ton unit, handling practically any Commercial refrigeration job and equally efficient for air-conditioning applications. I. M. E., at lowside pressure of 15 pounds—4174.

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Refrigeration Division
Utica, N. Y., U. S. A.

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Company .....

Address .....

Lipman

General Refrigeration Sales Co., Beloit, Wis.

Model No.	Methyl Chloride Units 32	52	53	72	73	102	103	152	153	202	203
Overall Dimensions (in.)											
Width	25½	31¾	31¾	31¾	31¾	31¾	31¾	34½	34½	34½	34½
Depth	16	19	18	19	20	19	20	21¼	24	22½	24
Height	17½	23½	23½	23½	23½	23½	23½	25½	25½	25½	25½
Refrigeration Capacity											
In lbs. I.E.M. per 24 hours	310	585	620	760	860	950	1090	1320	1525	1800	2065
Compressor Specifications											
Compressor speed (r.p.m.)	325	250	265	320	350	400	460	310	360	425	490
No. of cylinders	2	2	2	2	2	2	2	2	2	2	2
Bore (in.)	1¾	2⅜	2⅜	2⅜	2⅜	2⅜	2⅜	2⅜	2⅜	2⅜	2⅜
Stroke (in.)	2	2	2	2	2	2	2	3¼	3¼	3¼	3¼
Stroke (in.)	1½	1½	1½	1½	2¼	2¼	2¼	2¼	3½	5	3½
Motor size (hp.)	⅓	½	½	¾	¾	1	1	1½	1½	2	2
Quantity of refrigerant in system (lbs.)	4	6	6	6	6	8	8	10	10	12	12
Quantity of lubricant in system (qts.)	2	4	4	4	4	4	4	4	4	4	4

Model No.	Ammonia Units 41	51	61	81	101	151	210	310	410	1110	710-V
Overall Dimensions (in.)											
Width	22⅝	25	30¼	30¼	36½	36½	43½	52¾	56	68½	57¾
Depth	14¼	19	19¼	19¼	21½	21½	20½	20½	26¼	30	26¼
Height	20¾	21¾	24½	26½	33½	36	46¼	46¼	53	66	55½
Compressor Specifications											
Compressor speed (r.p.m.)	450	450	450	450	350	450	350	450	270	235	400
No. of cylinders	1	1	1	1	1	1	2	2	2	2	2
Bore (in.)	1½	1¾	2	2¼	2¼	2¼	2¼	2¼	3¼	4½	3¼
Motor size (hp.)	⅛	½	½	¾	1	1½	2	3	5	10	7½
Quantity of refrigerant in system (lbs.)	5½	6½	10	12	12½	20	25	35	50	135	75

* * *

Compressor

Type of system.....Conventional
Type of compressor.....Reciprocating
Compressor drive.....Belt
Type of shaft seal.....Bellows
Cylinder head cooled by.....Methyl models—air; ammonia models—water
Type of lubrication system.....Splash

Condenser & Liquid Receiver

Method of cooling.....Model 32, 52, 72, 102, 152, 202—air; others—water
Type of condenser.....Methyl units, air cooled—finned tube, water cooled—double tube; ammonia units, models 41 through 151—cylindrical submerged type; others—shell & tube
Type of liquid receiver.....Series 41 through 151—integral with crankcase; others—horizontal

Refrigerant

Kind used.....Models 32, 52, 53, 72, 73, 152, 153, 202, 203—methyl chloride; others—ammonia

Control

Make of control....Methyl units—Genuine Detroit Mercoid
Type of control.....Methyl units—pressure; ammonia units—temperature
High pressure cut-out.....All models
Condensing water flow controlled by Head pressure
Type of discharge valve.....Ammonia units—poppet; methyl units—disc
Type of suction valve.....Ammonia units—poppet; methyl units—disc
Type of overload cut-out.....Thermal

Materials Used

Cylinder block.....Semi-steel
Pistons.....Cast iron
Condenser tubes.....Methyl units—copper & seamless steel; ammonia units—charcoal iron
Condenser shell.....Semi-steel

Howe

Howe Ice Machine Co., 2825 Montrose Ave., Chicago, Ill.

Model No.	MW 120	MW 140	MW 240	MW 260	MW 280	MW 390	MW 3120
Overall Dimensions (in.)							
Width	42	48	48	48	48	48	48
Depth	18	18	18	18	18	22	22
Refrigeration Capacity							
In lbs. I.M.E. per 24 hrs.*	400	800	800	1200	1600	1800	2400
Compressor Specifications							
Compressor speed (r.p.m.)	300	600	300	450	600	450	600
No. of cylinders	1	1	2	2	2	3	3
Bore (in.)	2	2	2	2	2	2	2
Stroke (in.)	2	2	2	2	2	2	2
Motor size (hp.)	⅓	½	½	¾	1	1½	2

* * *

Compressor

Type of system.....Conventional
Type of compressor.....Reciprocating
Compressor drive.....Belt
Cylinder head cooled by.....Air

Condenser & Liquid Receiver

Method of cooling.....Water
Type of condenser.....Finned coil in steel shell
Type of liquid receiver.....Horizontal

Refrigerant

Kind used.....Methyl chloride

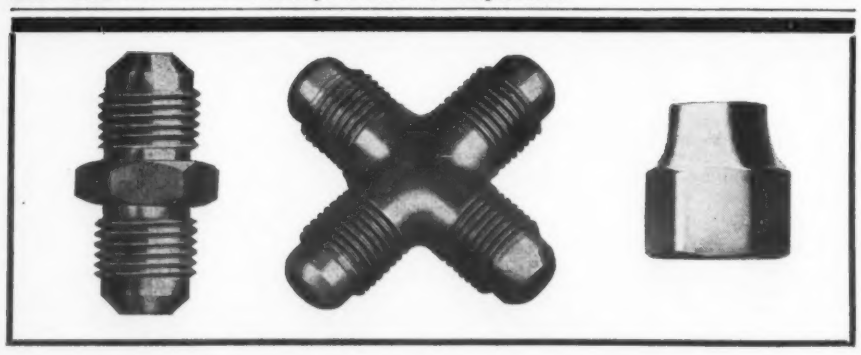
Control

Type of control.....Pressure
High pressure cut-out.....On all models
Condensing water flow controlled by.....Head pressure

Valves

Type of discharge valve.....Disc
Type of suction valve.....Disc
Type of water valve.....Pressure

* Rating based on a 22° F. evaporator temperature and 86° F. condensing medium temperature.



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COMMONWEALTH
BRASS CORPORATION
COMMONWEALTH AVE. AND G.T.R.R.
DETROIT

Starr

Starr Co., Richmond, Ind.

Model No.	B1SA B0MA	B5SA B3MA	B9SA B7MA	B13SA B11MA	B2SW B4MW	B6SW B8MW	B10SW B12MW	J1SA J3MA	J5SA J7MA
Overall Dimensions (in.)									
Width	25½	25½	29	29	29½	29½	29½	7½	7½
Depth	18	18	19	19	16½	16½	16½	9	9
Height	15¾	15¾	18	18	22	22	22	10	10
Refrigeration Capacity									
In lbs. I.M.E. per 24 hours									
(M models)	263	354	443	639	425	575	771	151	203
(S models)	253	317	360	462	320	400	750	117	140
Compressor Specifications									
Compressor speed (r.p.m.)									
(M models)	300	400	500	750	425	550	750	500	600
(S models)	400	500	600	750	400	500	750	550	650
No. of cylinders	2	2	2	2	2	2	2	2	2
Bore (in.)	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.125	1.125
Stroke (in.)	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.25	1.25
Motor size (hp.)									
(M models)	¼	⅓	½	¾	⅓	½	¾	⅛	⅛
(S models)	¼	⅓	½	¾	¼	⅓	½	⅛	⅛
Quantity of refrigerant in system (lbs.)									
(M models)	3½	3½	4½	4½	3½	4½	4½	1½	1½
(S models)	5	6	6	6	5	6	6	2½	2½

Model No.	J2SW J4MW	J6SW J8MW	D1SA D3MA	D5SA D7MA	DD9SA DD11MA	DD13SA	D4MW D2SW	DD12MW DD10SW D6SW	D8MW
Overall Dimensions (in.)									
Width	7½	7½	31	31	31	31	32½	32½	32½
Depth	9	9	21¾	21¾	24½	24½	20	20	20
Height	11½	11½	24¾	24¾	24¾	24¾	25¾	25¾	25¾
Refrigeration Capacity									
In lbs. I.M.E. per 24 hours									
(M models)	170	229	589	842	1230	...	682	975	1558
(S models)	126	150	444	571	745	1000	474	700	1000
Compressor Specifications									
Compressor speed (r.p.m.)									
(M models)	500	600	350	500	733	...	350	500	733
(S models)	550	650	350	450	600	800	350	500	733
No. of cylinders	2	2	2	2	2	2	2	2	2
Bore (in.)	1.125	1.125	2.125	2.125	2.125	2.125	2.125	2.125	2.125
Stroke (in.)	1.25	1.25	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Motor size (hp.)									
(M models)	⅛	⅛	¾	1	1½	...	¾	1	1½
(S models)	⅛	⅛	½	¾	1	1½	½	¾	1
Quantity of refrigerant in system (lbs.)									
(M models)	1½	1½	4	5	6	...	4	5	6
(S models)	2½	2½	5	6	7	7	5	6	7

Model No.	ATSA ARSA	A1SA AV3MA A4MW	A3MA	E3MA E1SA A2SA	E7MA E5SA	E4MW E2SW	E8MW E6SW
Overall Dimensions (in.)							
Width	18¾	14	18¾	18¾	34	35	35
Depth	14	14	14	14	25	19¾	19¾
Height	14½	22	14½	14½	27	29	29
Refrigeration Capacity							
In lbs. I.M.E. per 24 hours							
(M models)	...	180	215	180	1751	2264	2100	2868
(S models)	80 & 100	...	130	130	1399	1618	1390	1885
Compressor Specifications							
Compressor speed (r.p.m.)							
(M models)	...	408	408	408	350	425	350	475
(S models)	480	...	408	408	350	425	350	475
No. of cylinders	1	1	1	1	2	2	2	2
Bore (in.)	1.64	1.64	1.64	1.64	3.0	3.0	3.0	3.0
Stroke (in.)	1.625	1.625	1.625	1.625	3.0	3.0	3.0	3.0
Motor size (hp.)									
(M models)	...	⅛	⅛	⅛	2	3	2	3
(S models)	⅛ & ⅛	...	⅛	⅛	1½	2	1½	2
Quantity of refrigerant in system (lbs.)									
(M models)	...	1½	1½	1½	8½	10	8½	12
(S models)	2½	...	2½	2½	12	15	12	18

* * *

Compressor

Type of system.....Conventional
Type of compressor.....Reciprocating
Compressor drive.....Belt
Type of shaft seal.....Bellows
Cylinder head cooled by.....A models—air; W models—water
Type of lubrication system.....Splash

Condenser & Liquid Receiver

Method of cooling.....A models—air; W models—water
Type of condenser.....Air-cooled models—finned tube; water-cooled models—counter flow
Type of liquid receiver.....Horizontal
Has receiver fusible safety plug.....On special order

Valves

Type of discharge valve.....A models—reed; all others—disc
Type of suction valve.....Disc
Type of water valve.....Penn

Refrigerant

Kind used.....Methyl chloride or sulphur dioxide

Control

Make of control.....Detroit Lubricator
Type of control...Pressure or temperature
High pressure cut-out....All water models
Point of operation of cut-out.....Methyl chloride—150 lbs.; sulphur dioxide—135
Condensing water flow controlled by Penn automatic water valve
Type of overload cut-out...High pressure

Materials Used

Cylinder block.....Cast iron
Pistons.....Cast iron
Condenser tubes.....Seamless copper
Condenser shell.....Seamless steel
Quantity of lubricant in system.....B models—22 oz.; D models—4 pts.; SJ & J models—14 oz.; A models—15 oz.; E models—7½ pts.

*M models—methyl chloride; S models—sulphur dioxide.

Ice-O-Matic

Williams Oil-O-Matic Heating Corp., Ice-O-Matic division, Bloomington, Ill.

Model No.	A AW AAW	B BW BAW	H HW HAW	C CW CAW	D DW DAW	FW FAW	VW	WW
Overall Dimensions (in.)								
Width	27	27	35	35	35	37	37	37
Depth	18	18	23	23	23	23	23	23
Height	19	19	27	27	27	27	28½	28½
Refrigeration Capacity								
In lbs. I.M.E. per 24 hrs.	165	325	437	581	880	1400	1960	2800
Compressor Specifications								
Compressor speed (r.p.m.)	310	400	275	325	275	440	325	430
No. of cylinders	2	2	2	2	2	2	4	4
Bore (in.)	1½	1⅝	2	2	2⅜	2⅜	2⅜	2⅜
Stroke (in.)	1½	1½	2⅜	2¾	2½	2½	2½	2½
Motor size (hp.)	1/4	1/3	1/2	3/4	1	1-1/2	2	3
Quantity refrigerant in system (lbs.)	3	3	5	5	6	7	7	7
Pump down capacity of receiver (lbs.)	3.5	3.6	11	11	18	20	20	20
Quantity of lubricant in system (lbs.)	3	3	7	7	7	7	5	5

* * *

Compressor

Type of system.....Conventional
Type of compressor.....Reciprocating
Compressor drive.....Belt
Type of shaft seal.....Cooke
Cylinder head cooled by.....Models VW & WW—water; others—air
Type of lubrication system..Models VW & WW—forced; others—splash

Condenser & Liquid Receiver

Method of cooling.....Models A, B, H, C, D—air; models AAW, BAW, HAW, AW, BW, HW, CW, FW, VW, WW—CAW, DAW, FAW—air & water; models AW, BW, HW, CW, DW, FW, VW, WW—water
Type of condenser.....Finned tube
Type of liquid receiver.....Horizontal
Has receiver fusible safety plug.....Yes

Motor

Make of motor.....Wagner

Refrigerant

Kind used.....Methyl chloride

Control

Make of control.....Penn
Type of control.....Pressure
High pressure cut-out.....All models
Point of operation of cut-out.....165 lbs.
Condensing water flow controlled by Pressure valve
Type of overload cut-out..Thermal switch

Valves

Type of discharge valve.....Steel disc
Type of suction valve.....Steel disc
Type of water valve....Pressure regulated

Materials Used

Cylinder block.....Cast alloy iron
Pistons.....Cast iron
Condenser tubes.....Copper
Condenser shell.....Steel

New Beer Coolers Popular in Hawaii

HONOLULU, Hawaii — Theo. H. Davies & Co., Ltd., Servel distributor here, has recently made several installations of commercial refrigeration equipment, the installations covering a wide variety of applications.

The Sunset Drive-in market has been equipped with one of the most complete installations of modern refrigeration equipment made in the islands. Equipment installed consists of a 10-ft. Seeger double-duty meat display case, an 8-ft. full-vision front vegetable display case, and a 6-ft. full-vision front delicatessen display case. A 1½-hp. Servel condensing unit is supplying refrigeration for this job, the cooler being equipped with the Servel "Humidraft" forced-convection cooling unit.

A 2-hp. Servel unit has been installed in the Moanalua dairy to cool a 7x7 ft. storage box equipped with a Humidraft, to operate an ice maker with a capacity of 400 lbs. daily. and to cool 900 gals. of brine for circulating through a surface cooler.

The Post Exchange at Wheeler Field, Oahu, has been equipped with a 12-ft. Brunswick-Balke-Collender beer dispensing workboard unit and counter. The Occidental Cafe at Honolulu has been fitted out with a similar installation.

A No. 10 Temprite "over the counter" beer cooling unit and a two-barrel storage fixture have been installed for the New Orleans cafe.

An 8-ft. Seeger full-vision display case operating in conjunction with a ¼-hp. Servel condensing unit, and a Nelson ice cream cabinet with a ⅛-hp. Servel unit have been installed in the establishment of K. Takanishi Co., Kekaha, Kauai, T.H.

To refrigerate a display case for the Manila Trading Co., Hanapepe, Kauai, a Humidraft and a 1/3-hp. Servel condensing unit have been installed

Humidrafts have been installed in two 75-cu. ft. wall refrigerators at the 35th Infantry restaurant, Schofield barracks, Oahu.

A water cooling system, employing Temprite fixtures and a ½-hp. Servel condensing unit, has been installed for the Honolulu Iron Works Co.

Fire Brings Order for New Copeland Machine

DETROIT—The fire that gutted the huge Packers' Outlet retail market, located on Gratiot Ave. across from the City Airport, early last year had one beneficial effect—it made the antiquated refrigerator equipment installed in the market unfit for use and necessitated the installation of new display cases and a cooler when the market reopened recently.

Installed in the market by the Sanders' Butchers Supply Co. is 50 ft. of "Chilly Boy" refrigerated display counter together with a large, rehabilitated walk-in cooler. A 3-hp. Copeland condensing unit supplies refrigeration for the cases.

Fin coils are used throughout, the cases being of the back bunker type. Temperature control is through individual thermostats on each case. Refrigeration for the storage cooler is furnished by a Frigidaire unit.

Packers' Outlet market is situated in the "garage" of the old Detroit United Railway, inoperative interurban railway company. The market occupies 22,000 sq. ft. of floor space, and is operated on the "serve yourself" plan, the customers taking baskets which are checked at the exit gates.

Special GMC Refrigerated Truck Sold in Chicago

CHICAGO—Paradise Ice Cream Co. of this city has purchased the General Motors Truck Corp.'s "Century of Progress" demonstrator which was shown during the 1933 convention of the International Association of Ice Cream Manufacturers. Kold-Hold cooling units operating in conjunction with a Frigidaire compressor refrigerate the truck.

The body was built by Batavia Body Co. and, is of course, mounted on a General Motors Truck chasis. Its inside dimensions are length, 94 in.; width, 69 in. and height, 36 in. Insulation is 5 in. Dry Zero in the walls and roof and 5 in. cork in the floor.

Refrigeration equipment includes a 1-hp. Frigidaire compressor using Freon as the refrigerant and three model L-175 Kold-Hold cooling units.

Frank Named Manager of Ridgway Sales

PHILADELPHIA—Vernon L. Frank has been appointed sales manager of the Ridgway Refrigerator Co., local manufacturer of commercial refrigerator equipment, according to Norman Cantrell, general manager of the Ridgway Co.

Mr. Frank was formerly commercial sales supervisor of the Philadelphia branch of the York Ice Machinery Co.

Copeland

Copeland Refrigeration Corp., 332 Cass Ave., Mt. Clemens, Mich.

Model No.	IC-1	IC-2	IC-3	A-1-L	AM	Q	Q-2	QW-2	R
Overall Dimensions (in.)									
Width	14	14	21⅝	21	21	28¼	28¼	28¼	28¼
Depth	14½	14½	11⅝	17	17	17⅝	17⅝	14¾	17⅝
Height	25½	25¼	26⅛	16	16	19	19	18⅝	19
Refrigeration Capacity									
In lbs. I.M.E. per 24 hours	99	212	488	100	212	246	375	375	488
Compressor Specifications									
Compressor speed (r.p.m.)	360	360	440	360	360	440	300	300	440
No. of cylinders	1	1	2	1	1	1	2	2	2
Bore (in.)	1½	2	2	1½	2	2	2	2	2
Stroke (in.)	1½	1½	1½	1½	1½	1½	1½	1½	1½
Motor size (hp.)	⅛	¼	⅓	⅛	¼	⅓	⅓	⅓	½
Quantity of refrigerant in system (lbs.)	2	2	2	2	2	5	5	5	5
Pump down capacity of receiver (lbs.)	2	2	2	2	2	5	5	5	5
Quantity of oil in system (pts.)	⅝	⅝	1¾	⅝	⅝	⅞	1¾	1¾	1¾

Model No.	RW	SA	W	WA	X	XA	V	Y	Z
Overall Dimensions (in.)									
Width	28¼	28¼	38¼	38¼	38½	39¼	38½	47½	47½
Depth	14¾	18	18½	23⅞	18½	23⅞	18½	21⅜	21⅜
Height	18⅝	19	27¼	24¾	27¼	24¾	27¼	30	30
Refrigeration Capacity									
In lbs. I.M.E. per 24 hours	488	640	776	776	1073	1073	1600	2375	3250
Compressor Specifications									
Compressor speed (r.p.m.)	440	640	250	250	365	365	500	365	500
No. of cylinders	2	2	2	2	2	2	2	3	3
Bore (in.)	2	2	2¼	2¼	2¼	2¼	2¼	2¼	2¼
Stroke (in.)	1½	1½	3	3	3	3	3	4	4
Motor size (hp.)	½	¾	¾	1	1	1½	1½	2	3
Quantity of refrigerant in system (lbs.)	5	5	5	5	5	5	5	10	10
Pump down capacity of receiver (lbs.)	5	5	5	5	5	5	5	10	10
Quantity of oil in system (pts.)	1¾	2	6	6	6	6	6	7	7

* * *

Compressor
Type of system.....Conventional
Type of compressor.....Reciprocating
Compressor drive.....Belt
Type of shaft seal.....Bellows
Cylinder head cooled by.....Models Y & Z—water; all others—air

Motor
Make of motor.....Delco

Refrigerant
Kind used.....Methyl chloride

Control
Make of control.....Penn
Type of control....Pressure & temperature
High pressure cut-out..water cooled models
Point of operation of cut-out.....175 lbs.
Condensing water flow controlled by.....Pressure regulating valve

Condenser & Liquid Receiver
Method of cooling..Models QW-2, RW, W, X, V, Y, Z—water; others—air
Type of condenser.....Air cooled models—finned tube; others—shell & tube
Type of liquid receiver....Models Q, Q-2, QW-2, R, RW—horizontal; all others—vertical
Have fusible plug.....Models A-1-L, AM, IC-1, IC-2, IC-3—no; all others—yes

Valves
Type of piston valves.....Disc
Type of discharge valves.....Disc
Type of water valve.....Pressure

Materials Used
Cylinder block.....Semi-steel
Pistons.....Semi-steel
Condenser tubes.....Copper
Condenser shell.....Steel

Mayflower

Trupar Mfg. Co., 140 Davis Ave., Dayton Ohio

Model No.	S2025A	A2033A	3033A	3050A	4050A	4075A	4100A	5100A
Overall Dimensions (in.)								
Width	19¼	22¾	29¼	29¼	29¼	29¼	29¼	37¼
Depth	16¾	17¼	18½	18½	18½	18½	18½	20
Height	13	13	20	20	20	20	20	26
Refrigeration Capacity								
Lbs. I.M.E. per 14 hours based on zero suction pressure 80° condensing medium	173	213	233	299	352	505	505	...
Compressor Specifications								
Compressor speed (r.p.m.)	400	500	500	500	365	500	500	350
No. of cylinders	2	2	2	2	2	2	2	2
Bore (in.)	1⅜	1⅜	1⅝	1⅝	2⅛	2⅛	2⅛	2½
Stroke (in.)	1¾	1¾	2	2	2½	2½	2½	3
Motor size (hp.)	¼	⅓	⅓	½	½	¾	1	1
Quantity of refrigerant in system (lbs.)	2½	2½	6	6	6	6	6	7
Pump down capacity of receiver (lbs.)	6	6	16	16	16	16	16	20
Quantity of lubricant in system (pts.)	1	1	1¼	1¼	1¾	1¾	1¾	2

Model No.	A 5150	W 3033	W 3050	W 4075	W 4100	W 5100	W 5150	MC 5200
Overall Dimensions (in.)								
Width	37¼	29¼	29¼	29¼	29¼	37¼	37¼	37⅛
Depth	20	18½	18½	18½	18½	20	20	20
Height	26	20	20	20	20	26	26	26
Refrigeration Capacity								
Lbs. I.M.E. per 14 hours based on zero suction pressure 80° condensing medium	665	252	268	585	...	635	784	1176
Compressor Specifications								
Compressor speed (r.p.m.)	350	500	500	500	500	385	385	485
No. of cylinders	2	2	2	2	2	2	2	2
Bore (in.)	2½	1⅝	1⅝	2⅛	2⅛	2½	2½	2½
Stroke (in.)	3	2	2	2½	2½	3	3	3
Motor size (hp.)	1½	⅛	½	¾	1	1	1½	2
Quantity of refrigerant in system (lbs.)	7	6	6	6	7	7	7	7
Pump down capacity of receiver (lbs.)	20	16	16	16	16	20	20	20
Quantity of lubricant in system (pts.)	2	1¼	1¼	1¾	1¾	2	2	2

* * *

Compressor
Type of system.....Conventional
Type of compressor.....Reciprocating
Compressor drive.....Belt
Type of shaft seal.....Diaphragm
Cylinder head cooled by..Water on water-cooled models—air on air-cooled models
Type of lubrication system.....Splash

Condenser & Liquid Receiver
Method of cooling.....Air or water
Type of condenser.....Finned tube on air-cooled models; tube-within-tube on water-cooled models
Type of liquid receiver.....Horizontal
Has receiver fusible safety plug.....Yes

Valves
Type of discharge valve.....Disc
Type of suction valve.....Disc
Type of water valve.....Solenoid

Motor
Make of motor.....Master or Delco

Refrigerant
Kind used.....Sulphur dioxide or methyl chloride

Control
Make of control.....Detroit
Type of control...Pressure or temperature
High pressure cut-out.....All models
Point of operation of cut-out.....Methyl chloride models—155 lbs.; SO_2 models—133 lbs.
Condensing water flow controlled.....Electrically
Type of overload cut-out.....Fuse

Materials Used
Cylinder block.....Cast iron
Pistons.....Cast iron
Condenser tubes.....Copper

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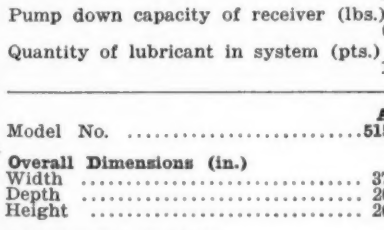

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The Acme Welded Pipe & Coil Co., Jackson, Mich.

Phoenix

Phoenix Ice Machine Co., 2711 Church Ave., Cleveland, Ohio

Model No.	PAC	PAE	PAF	PWF	PAH	PWH	PAI	PWI
Overall Dimensions (in.)								
Width	22¼	24	29½	32½	36	36	36	45
Depth	13¼	18	18	18	23½	23½	23½	23½
Height	16½	20½	21	21	26½	27½	26½	27½
Refrigeration Capacity								
In lbs. I.M.E. per 24 hours	168	240	355	415	653	700	818	979
Compressor Specifications								
Compressor speed (r.p.m.)	430	490	540	590	325	...	400	470
No. of cylinders	1	2	2	2	2	2	2	2
Bore (in.)	1¾	1½	1¾	1¾	2½	2½	2½	2½
Stroke (in.)	1¼	1¼	1¼	1¼	1¾	1¾	1¾	1¾
Motor size (hp.)	¼	⅓	½	½	¾	¾	1	1
Quantity of refrigerant in system (lbs.)	2	3	3	3	8	8	8	8

Model No.	PAJ	PWJ	PWK	PWL	PWM	E	EE	K
Overall Dimensions (in.)								
Width	36	36	51	51	51	54	60	60
Depth	23½	23½	24½	23	23¼	30	32	42
Height	28	28	29	29	29½	47	52	64
Refrigeration Capacity								
In lbs. I.M.E. per 24 hours	958	1157	2016	2844	4812	1840	3680	5400
Compressor Specifications								
Compressor speed (r.p.m.)	320	400	400	480	480	400	400	400
No. of cylinders	2	2	3	3	3	1	2	2
Bore (in.)	2¼	2¼	2½	2½	3¼	2¾	2¾	3
Stroke (in.)	3	3	3	3	3	2½	2½	3
Motor size (hp.)	1½	1½	2	3	5	2	3	5
Quantity of refrigerant in system (lbs.)	8	8	12	12	12	25	50	75

* * *

Compressor
Type of system.....Conventional
Type of compressor.....Reciprocating
Compressor drive.....V-belt
Type of shaft seal.....Models E, EE, & K—rotary; others—bellows
Cylinder head cooled by.....Models PWK, PWL, PWM, E, EE, & K—waters; others—air
Type of lubrication system.....Splash

Condenser & Liquid Receiver
Method of cooling.....DW, E, & K models—water; other—air
Type of condenser...PA models—radiator; PW models—double tube; E & K models—shell & tube
Has receiver fusible safety plug....E & K models—no; others—yes
Type of liquid receiver.....Horizontal

Refrigerant
Kind used.....E & K models—ammonia; others—methyl chloride

Control
Make of control.....Tagliabue, Penn, Detroit Lubricator
High pressure cut-out.....All models
Point of operation of cut-out.....Methyl models—150 lbs.; ammonia—225 lbs.
Type of control...Pressure or temperature
Condensing water flow controlled by Pressure regulator
Type of overload cut-out.....Thermal

Valves
Type of discharge valve.....Disc
Type of suction valve.....Poppet
Type of water valve....Pressure actuated

Materials Used
Cylinder block.....Cast iron
Pistons.....Cast iron
Condenser tubes.....Steel
Condenser shell.....Steel

Icemaster

Icemaster Co., 114 Hale St., Haverhill, Mass.

Model No.	BK M22	BKA M22	XB MP22	XBA MP22	B M33
Overall Dimensions (in.)					
Width	33	33	33	33	42
Depth	21⅛	21½	22	22	25
Height	26	26	28	28	28
Refrigeration Capacity					
In lbs. I.M.E. per 24 hrs.	450	575	900	1200	1650
Compressor Specifications					
Compressor speed (r.p.m.)	350	425	300	425	300
No. of cylinders	2	2	2	2	2
Bore (in.)	2⅛	2⅛	2⅛	2⅛	3
Stroke (in.)	2	2	3¼	3¼	3
Quantity of lubricant in system (lbs.)	3	3	3½	3½	5
Pump down capacity of receiver (lbs.)	7	7	10	10	14
Motor size (hp.)	1/2	3/4	1	1-1/2	2
Quantity of refrigerant in system (lbs.)	7	7	10	10	14

Motor
Make of motor.....Wagner & Century

Compressor
Type of system.....Conventional
Type of compressor.....Reciprocating
Compressor drive.....Belt
Type of shaft seal.....Bellows
Cylinder head cooled by.....Air
Type of lubrication system.....Splash

Condenser & Liquid Receiver
Method of cooling.....Air
Type of condenser.....Finned tube
Type of liquid receiver.....Horizontal
Has receiver fusible safety plug.....No

Refrigerant
Kind used.....Methyl chloride

Control
Make of control.....Mercoid
Type of control.....Temperature

Valves
Type of discharge valve.....Flapper
Type of suction valve.....Disc

Materials Used
Cylinder block.....Cast iron
Pistons.....Cast iron
Condenser tubes.....Copper
Condenser shell.....Steel

Kerotest Type 447 Two Way Packed Backseating Valve.

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Cleveland, Ohio, 1748 East 22nd St.....Williams & Company, Inc.
Decatur, Ill., 133 Williams St.....Field & Shorb Co.
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Des Moines, Ia., W. 11th & D.M.U.R.R....C. L. Percival Co.
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San Francisco, Calif., 380 Brannan St.....Refrigerating & Power Specialties Co.
St. Louis, Mo., 2817 Laclede Ave.....Brass & Copper Sales Co.
Seattle, Wash., 314 Ninth Ave., No.....Harrison Sales Co.
Sioux City, Iowa, 2310 East Eighth St.....National Refrigeration Service
Springfield, Mass., 593 Main St.....Home Utilities Company
Syracuse, N. Y., 314 W. Fayette St.....Syracuse Supply Company
Toronto, Ont., Canada, 82 Ontario St.....Railway & Engineering Specialties, Ltd.
Vancouver, B. C., Canada.....Fleck Bros., Limited
Washington, D. C., 308 10th St., N. W....Refrigeration Equipment & Supply Co., Inc.
Winnipeg, Man., Canada, 156 Bell Ave.....Arctic Ice and Fuel Co., Ltd.

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Puerto Rico.....Refrigeration Supply Co., P. O. Box 128, Puerta de Tierra, San Juan

Brunswick Develops 2 Direct Expansion Salad-Cooling Units

CHICAGO — Brunswick-Balke-Collender Co. has recently expanded its line of beverage and food dispensing equipment with a mechanically refrigerated salad unit available in 2½ and 4½ ft. lengths.

Refrigeration is supplied to the new salad tray by a direct-expansion fin coil. For the salad pans, an individual coil connection in multiple series with the fin coil used for the lower refrigerator compartment, maintains a predetermined temperature. Temperature control is maintained by a thermostatic valve.

Units are insulated with 3-in. waterproofed insulation. Interior is finished in porcelain enamel. Front and doors are covered with stainless steel, with heavy refrigeration door hardware. The door is also equipped with breakers which prevent heat from entering from the outside surface.

Salad pans are deep and made of white porcelain enamel with blue porcelain enamel edges. Four small and one large pan are standard for the 2½-ft. unit, while two large and eight small pans are standard for the 4½-ft. unit. Frames holding the pans are made of stainless steel. All of the salad pans are covered with a collapsible hood.

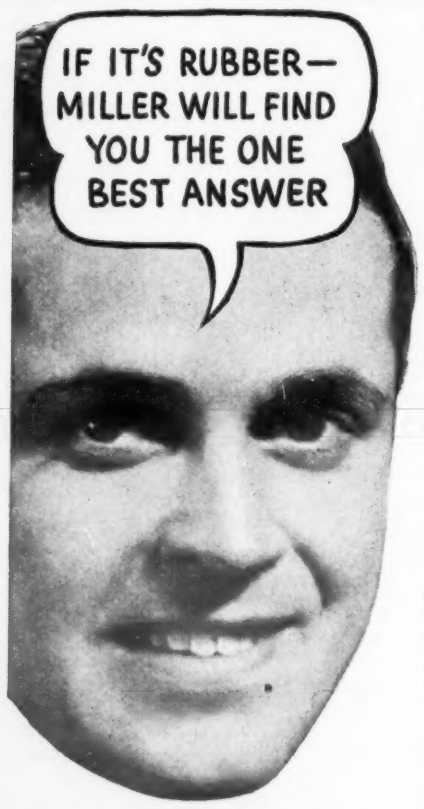
Other features of the unit are a crumb chute and a stainless steel splash board.

M-K-T Railroad Completes Four New Diners

SEDALIA, Mo. — Missouri-Kansas-Texas Railroad Co. here has just completed four new diners having kitchen and pantry equipment of Enduro stainless steel, a product of Republic Steel Corp., central alloy division, Massillon, Ohio. Present plans call for four more diners of this type.

The range, broiler, steam table and all lockers are of stainless steel. All tables are covered with the metal, and the ice wells, refrigerator, water tanks, and filter water tanks are lined with it.

In addition to the new diners, three deluxe club cars with soda fountains and back bars of Enduro stainless steel are in service on M-K-T lines.



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Miller

Brunner

Brunner Mfg. Co., Utica, N. Y.

Model No.	A-25	A-33	A-50	W-50	A-75	W-75	A-100	W-100	A-150	W-150	W-200	W-300
Overall Dimensions (in.)												
Width	21	21	28	28	28	28	36	36	36	36	54	54
Depth	18¾	18¾	18	18	20	20	24½	24½	24½	24½	20	20
Height	16	16	19	19	19	19	22½	22½	22½	22½	25	25
Refrigeration Capacity												
In lbs. I.M.E. per 24 hours (A.S.R.E. rating)	193	264	370	370	711	711	1009	1009	1411	1411	2037	2674
Compressor Specifications												
Compressor speed (r.p.m.)	275	375	525	525	475	475	375	375	525	525	400	525
No. of cylinders	2	2	2	2	2	2	2	2	2	2	2	2
Bore (in.)	1⅝	1⅝	1⅝	1⅝	2	2	2½	2½	2½	2½	3¼	3¼
Stroke (in.)	1⅜	1⅜	1⅜	1⅜	1¾	1¾	2	2	2	2	2¼	2¼
Motor size (hp.)	¼	⅓	½	½	¾	¾	1	1	1½	1½	2	3
Quantity of refrigerant in system (lbs.)	2	2	4	4	4	4	8	8	8	8	12	12
Pump down capacity of receiver in lbs.	3	3	5	5	5	5	13	13	13	13	21	21
Quantity of lubricant in system (lbs.)	1½	1½	1½	1½	3½	3½	5	5	5	5	5	5

* * *

Compressor
Type of system.....Conventional
Type of compressor.....Reciprocating
Compressor drive.....Belt
Type of shaft seal.....Bellows
Cylinder head cooled by.....Air
Type of lubrication system.....Splash

Condenser & Liquid Receiver
Method of cooling.....A models—air; W models—water
Type of condenser.....A models—finned tube; W models—double tube
Type of liquid receiver.....Horizontal
Has receiver fusible safety plug.....No

Motor
Make of motor.....Wagner

Refrigerant
Kind used.....Methyl chloride

Control
Make of control.....Detroit Lubricator
Type of control...Pressure or temperature
High pressure cut-out..On W models only
Point of operation of cut-out.....130 lbs.
Condensing water flow controlled by Automatic water valve
Type of overload cut-out....Models A-100, W-100, A-150, W-150, W-200, W-300—in magnetic starter; others—none

Valves
Type of discharge valve.....Flex leaf
Type of suction valve.....Flex leaf
Type of water valve.....Pressure

Materials Used
Cylinder block.....Nickel iron
Pistons.....Nickel iron
Condenser tubes.....Copper
Condenser shell.....Copper

Bedell

Bedell Engineering Co., 5400 Santa Fe Ave., Los Angeles, Calif.

Model No.	G	F	EW	EA	BW	BA	CW	CA	DW	DA	H	I
Refrigeration Capacity												
In lbs. I.M.E. per 24 hours	144	172	414	345	1171	976	2332	1944	3168	2640	8000	20000
Compressor Specifications												
Compressor speed (r.p.m.)	350	350	350	350	350	350	350	350	350	350	275	275
No. of cylinders	1	1	2	2	2	2	4	4	6	6	2	2
Bore (in.)	1⅝	1¾	1¾	1¾	2¼	2¼	2¼	2¼	2¼	2¼	4	5½
Stroke (in.)	1⅝	1¾	1¾	1¾	2¼	2¼	2¼	2¼	2¼	2¼	4	5½
Motor size (hp.)	¼	⅓	⅓	½	½	¾	1	1½	1½	2	5	15

* * *

Compressor
Type of system.....Conventional
Type of compressor.....Reciprocating
Compressor drive.....Belt
Type of shaft seal.....Rotary
Cylinder head cooled by.....Air
Type of lubrication system.....Splash

Motor
Make of motor.....Wagner & Century

Valves
Type of discharge valve.....Disc
Type of suction valve.....Disc

Condenser & Liquid Receiver
Method of cooling.....G, F, & all A models—air; others—water
Type of condenser.....Finned tube
Type of liquid receiver.....Horizontal
Has receiver fusible safety plug.....Yes

Refrigerant
Kind used.....Model H & I—methyl chloride or ammonia; others—methyl chloride

Control
Make of control.....Penn
Type of control.....Pressure
High pressure cut-out.....All models
Condensing water flow controlled by.....Counter flow
Type of overload cut-out.....Penn

Materials Used
Pistons.....Gray iron, & nickel & steel
Condenser tubes.....Copper
Condenser shell.....Steel

*Models can also be supplied with sulphur dioxide as the refrigerant.

Diceler

Deissler Machine Co., Greenville, Pa.

Model No.	400 MA	800 MA	1600 MA	2600 MA	2600 MW	2800 MA	2800 MW	3800 MA	3800 MW
Overall Dimensions (in.)									
Width	17½	17½	21	21	22½	25	27½	28½	31
Depth	14¾	15½	18	19	20	18	20	20½	24
Height	12	12	18½	20	20	18½	17	22	19
Refrigeration Capacity									
In lbs. I.M.E. per 24 hrs.	153	190	254	397	476	493	573	664	790
Compressor speed (r.p.m.)	388	475	320	475	475	525	550	375	410
No. of cylinders	1	1	2	2	2	2	2	4	4
Bore (in.)	1⅝	1⅝	1⅝	1⅝	1⅝	1¾	1¾	1⅝	1⅝
Stroke (in.)	1⅝	1⅝	1⅝	1⅝	1⅝	1⅝	1⅝	1⅝	1⅝
Motor size (hp.)	⅙	¼	¼	⅓	½	½	½	¾	¾
Quantity refrigerant in system (lbs.)	2	2½	3	3½	3½	4	4	5	5
Pump down capacity of receiver in lbs. of refrigerant	4	4	6	8	8	9	9	12	12
Quantity lubricant in system (lbs.)	¾	¾	2¼	2½	2½	3	3	5½	5½

Model No.	3900 MA	3900 MW	4000 MA	4000 MW	4500 MA	4500 MW	5000 MW	6000 MW	6400 MW	6800 MW
Overall Dimensions (in.)										
Width	30	31	30½	31½	35½	37½	37½	55	55	55
Depth	21½	25	22	25½	25½	27½	27½	31	31	31
Height	25	21	25	22	26	22½	24	34	34	34
Refrigeration Capacity										
In lbs. I.M.E. per 24 hours	826	1021	1490	1785	2025	2380	3210	5960	9525	11000
Compressor speed (r.p.m.)	475	510	375	410	475	510	475	355	570	650
No. of cylinders	4	4	4	4	4	4	2	4	4	4
Bore (in.)	1¾	1¾	2	2	2	2	3	——	3-1/16	——
Stroke (in.)	1⅝	1⅝	2⅛	2⅛	2⅛	2⅛	3	3¼	3¼	3¼
Motor size (hp.)	1	1	1½	1½	2	2	3	5	7	10
Quantity refrigerant in system (lbs.)	5½	5½	5½	5½	6	6	8	12	12	12
Pump down capacity of receiver in lbs. of refrigerant	12	12	12	12	26	26	26	70	90	90
Quantity lubricant in system (lbs.)	5¾	5¾	7	7	8	8	6	12	12	16

* * *

Compressor
Type of system.....Conventional
Type of compressor.....Reciprocating
Compressor drive.....Belt
Type of shaft seal.....Bellows
Cylinder head cooled by...A models—air; W models—water
Type of lubrication system.....Splash

Condenser & Liquid Receiver
Method of cooling.....A models—air; W models—water
Type of condenser....Air-cooled models—finned tube; water-cooled models—double tube
Type of liquid receiver.....Horizontal
Has receiver fusible safety plug.....All models with 2 hp. and larger motors—yes; others—no

Motor
Make of motor.....Century & Wagner

Refrigerant
Kind used.....Methyl chloride

Control
Make of control.....Penn or Tagliabue
Type of control.....Pressure
High pressure cut-out.....All W models and all A models starting with 4000 series
Point of operation of cut-out.....150 lbs.
Condenser water flow controlled by Pressure

Valves
Type of discharge valve.....Disc
Type of suction valve.....Disc
Type of water valve....Penn or Tagliabue

Materials Used
Cylinder block.....Nickeled iron
Pistons.....Cast iron
Condenser tubes.....Copper
Condenser shell.....Copper

Frick

Frick Co., Waynesboro, Pa.

Model No.	F251	F332	FW332	F502	FW 502	F 752	FW 752
Overall Dimensions (in.)							
Width	14¼	16	16	18	18	18	18
Length	24	24	24	29½	29½	29½	29½
Height	19¼	19¼	19¼	21½	21½	21½	21½
Refrigeration Capacity							
In lbs. I.M.E. per 24 hours*	112.8	249.6	324.0	422.4	537.6	508.8	643.2
Compressor Specifications							
Compressor speed (r.p.m.	320	320	320	320	360	360	430
No. of cylinders	1	2	2	2	2	2	2
Bore (in.)	1.8125	1.8125	1.8125	2.25	2.25	2.25	2.25
Stroke (in.)	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Motor size (hp.)	¼	⅓	⅓	½	½	¾	¾
Quantity of refrigerant in system (lbs.)	2	3½	3½	4	4½	4½	5
Quantity of lubricant in system (pts.)	¾	3	3	3	3	3	3

Model No.	F 1002	FW 1002	F 1502	FW 1502	FW 2003	FW 3003	1½
Overall Dimensions (in.)							
Width	23½	23½	23½	23½	23	23	43½
Length	36½	36½	36½	36½	51	51	18½
Height	28	28	28	28	29	29	49
Refrigeration Capacity							
In lbs. I.M.E. per 24 hours*	835.2	972.0	957.6	1156.8	2016.0	2844.0	1000.0
Compressor Specifications							
Compressor speed (r.p.m.)	275	320	320	400	400	480	...
No. of cylinders	2	2	2	2	3	3	2
Bore (in.)	2.25	2.25	2.25	2.25	2.5	2.5	1.5
Stroke (in.)	3.0	3.0	3.0	3.0	3.0	3.0	1.5
Motor size (hp.)	1	1	1½	1½	2	3	1
Quantity of lubricant in system (pts.)	6	6	6	6	8	8	...
Quantity of refrigerant in system (lbs.)	8	8	8	8	12	12	...

* * *

Compressor
Type of system.....Conventional
Type of compressor.....Reciprocating
Compressor drive.....Model 1½—direct; others—V-belt
Type of shaft seal.....Sealing surface revolves with shaft and seals against a polished seat on housing cover
Cylinder head cooled by.....Model 1½—water; others—air
Type of lubrication system.....Splash

Condenser & Liquid Receiver
Method of cooling.....Models FW332, FW502, FW752, FW1002, FW1502, FW2003, FW3003, 1½—water; others—air
Type of condenser.....Water-cooled models—coil; air-cooled models—radiator; model 1½—shell & tube
Type of liquid receiver.....Horizontal
Has receiver fusible safety plug....Models F1002, FW1002, F1502 FW1502, FW2003, FW3003—yes; others—no

Motor
Make of motor.....Model 1½—Fairbanks-Morse; others—Wagner

Refrigerant
Kind used.....Model 1½—ammonia; others—methyl chloride

Control
Make of control.....Model 1½—Bradley; others—Cutler-Hammer
Type of control.....Model 1½—temperature; others—pressure
High pressure cut-out.....All models
Point of operation of cut-out.....135 lbs.
Condensing water flow controlled by Pressure

Valves
Type of discharge valve.....Model 1½—Poppet; others—disc
Type of suction valve.....Model 1½—Poppet; others—disc
Type of water valve.....Penn

Materials Used
Cylinder block.....Model 1½—semi-steel; others—cast iron
Pistons.....Model 1½—semi-steel; others—cast iron
Condenser tubes.....Model 1½—steel; others—copper
Condenser shell.....Model 1½—steel; others—copper

*Air-cooled units rated at discharge pressure corresponding to 104° F.

Froskist

Parker Mfg. Co., 2625 Santa Fe Ave., Los Angeles, Calif.

Model No.	A 1020	A 620	A 1220	A 1425D	A 1625D	A 1633D	A 1625	A 1633	A 2033	A 2250
Overall Dimensions (in.)										
Width	16	16	16	16	16	16	18	18	18	18
Length	21	21	21	21	21	21	26	26	29	29
Height	16	16	16	16	16	16	18	18	19	19
Refrigeration Capacity										
In lbs. ice melting effect per 24 hours										
Using SO_2	103	103	129	161	200	281	200	281	428	500
Using methyl or Freon	122	122	153	191	240	337	240	337	515	600
Compressor Specifications										
Compressor speed (r.p.m.)	385	425	425	425	425	500	425	500	500	500
No. of cylinders	1	2	2	2	2	2	2	2	2	2
Bore (in.)	1¾	1¼	1¼	1½	1¾	1¾	1¾	1¾	2	2¼
Stroke (in.)	1¼	1	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼
Motor size (hp.)	⅛	⅛	⅛	¼	¼	⅓	¼	⅓	⅓	½

Model No.	A4075 Air	A4075 Water	A6010 Air	A6010 Water	A6015 Air	A6015 Water	A6002 Air	A6002 Water	A1002 Air	A1002 Water	A1003 Air	A1003 Water
Overall Dimensions (in.)												
Width	24	24	24	24	24	24	24	24	31	31	31	31
Length	33	33	33	33	33	33	33	33	37	37	37	37
Height	28	28	28	28	28	28	28	28	29	29	29	29
Refrigeration Capacity												
In lbs. ice melting effect per 24 hours												
Using SO_2	711	750	878	918	1025	1080	1085	1143	1613	1685	2002	2110
Using methyl or Freon	935	975	1145	1175	1350	1410	1430	1492	2102	2192	2630	2750
Compressor Specifications												
Compressor speed (r.p.m.)	425	425	360	360	425	425	450	450	360	360	450	450
No. of cylinders	2	2	2	2	2	2	2	2	2	2	2	2
Bore (in.)	2⅛	2⅛	2⅛	2⅛	2⅛	2⅛	2⅛	2⅛	3	3	3	3
Stroke (in.)	2¼	2¼	3¼	3¼	3¼	3¼	3¼	3¼	3	3	3	3
Motor size (hp.)	¾	¾	1	1	1½	1½	2	2	2	2	3	3

* * *

Compressor
Type of system.....Conventional
Type of compressor.....Reciprocating
Compressor drive.....Belt
Type of shaft seal.....Sylphon
Cylinder head cooled by.....Air-cooled models—air; water-cooled models—water
Type of lubrication system.....Splash

Condenser & Liquid Receiver
Method of cooling.....Models A1020, A620, 1220, A1425, A1625, A1633, A2033, A2250—air-cooled condensers; others as designated
Type of condenser.....Models A620, A1625—single pass; models A1633, A2033, A2250, A4075 (air), A6010 (air), A6015 (air)—double pass; models A1002 (air), A1003 (air)—triple pass; all water-cooled models—double pipe
Type of liquid receiver.....Models A1020, A1220, A1425, A620, A1625, A1633—vertical; others—horizontal
Has receiver fusible safety plug.....No

Motor
Make of motor.....General Electric

Refrigerant
Kind used.....Methyl chloride (CH_3Cl) or sulphur dioxide (SO_2)

Control
Make of control.....Bishop & Babcock or Penn
Type of control.....Pressure
Type of high pressure cut-out....Lowside
Point of operation of cut-out.....140 lbs.
Condensing water flow controlled by Pressure
Type of overload cut-out..General Electric

Valves
Type of discharge valve.....Disc
Type of suction valve.....Disc
Type of water valve.....Penn

Materials Used
Cylinder block.....Cast iron
Pistons.....Cast iron
Condenser tubes.....Copper
Condenser shell.....Copper

*Manufacturer's rating. Based on 75° F. air temperature or 65° F. condensing water temperature, with 25° F. evaporator temperature.

● *Extra Dry* ESOTOO
LIQUID SULPHUR DIOXIDE
● V-METH-L
METHYL CHLORIDE

WEST NORFOLK, VA.
131 State St., Boston, and
76 Beaver St., New York

M & E

Merchant & Evans Co., 2035 Washington Ave., Philadelphia, Pa.

Model No.	175 MC	275 MC	350 MC	450 MC	725 MC	1100 MC	1125 MC	600 WMC	1300 WMC
Overall Dimensions (in.)									
Width	21	30	30	30	33	40	33	34	44
Depth	15	22	22	22	22	22	23	22	22
Height	14	18	18	18	23	25	22	20	25
Refrigeration Capacity									
In lbs. I.M.E. per 24 hours	210	330	418	600	900	1310	1310	621	1560
Compressor Specifications									
No. of cylinders	1	2	2	2	2	2	2	2	2
Bore (in.)	1½	1½	1½	1⅝	2¼	2⅝	2¼	1⅝	2⅝
Stroke (in.)	1¼	2	2	2	2⅛	3½	3	2	3½
Motor size (hp.)	¼	⅓	½	¾	1	1½	1½	¾	1½
Pump down capacity of receiver (lbs.)	5	15	15	15	15	28	15	7	13
Quantity of refrigerant in system (lbs.)	2	7	7	7	7	13	7	15	28
Quantity of lubricant in system (lbs.)	½	2½	2½	2¾	3¼	6	3¼	2¾	6

Model No.	1325 WMC	1800 WMC	C275 WMC	C350 WMC	C450 WMC	C725 WMC	C1125 WMC	C1825 WMC	C2500 WMC
Overall Dimensions (in.)									
Width	36	44	34	34	34	33	36½	41	41
Depth	24	22	22	22	22	21	24	26	26
Height	22	25	20	20	20	23	22	27	27
Refrigeration Capacity									
In lbs. I.M.E. per 24 hours	1560	2160	330	418	600	900	1310	2160	2800
Compressor Specifications									
No. of cylinders	2	2	2	2	2	2	2	2	2
Bore (in.)	2¼	2⅝	1⅝	1⅝	1⅝	2¼	2¼	2¼	2¼
Stroke (in.)	3	3½	2	2	2	2⅛	3	3½	3½
Motor size (hp.)	1½	2	⅓	½	¾	1	1½	2	3
Pump down capacity of receiver (lbs.)	15	13	15	15	15	15	15	15	15
Quantity of refrigerant in system (lbs.)	7	28	7	7	7	7	7	7	7
Quantity of lubricant in system (lbs.)	3¼	6	2¾	2¾	2¾	3¼	3¼	3¼	3¼

* * *

Compressor
Type of system.....Conventional
Type of compressor.....Reciprocating
Type of drive.....Belt
Type of shaft seal.....Model 175MC—diaphragm; others—bellows
Cylinder head cooled by.....MC models—air; WMC models—water
Type of lubrication system.....Splash

Condenser & Liquid Receiver
Method of cooling.....MC models—air; C models—air; others—both
Type of condenser.....Air cooled models—finned tube
Type of liquid receiver.....Horizontal
Has receiver fusible safety plug.....No

Valves
Type of discharge valve.....Disc
Type of suction valve.....Piston Disc
Type of water valve.....Penn

Control
Make of control.....Detroit or Mercoid
Type of control.....Pressure
High pressure cut-out.....All models
Point of operation of high pressure cut-out.....175 lbs.
How is condensing water flow controlled.....Water valve
Type of overload cut-out.....Cutler-Hammer & Allen-Bradley

Motor
Make of motor.....Wagner

Refrigerant
Kind used.....Methyl chloride

Materials Used
Cylinder block.....Semi-steel
Pistons.....Cast iron
Condenser tubes.....Copper
Condenser shell.....Steel

Carrier

Carrier Products Corp., Newark, N. J.

Model No.	AM 50-14	AM 50-13	AM 51-13	AM 51-12	AM 52-34	AM 52-10	AM 53-15
Overall Dimensions (in.)							
Width	23½	23½	32⅞	32⅞	36¼	36¼	40½
Depth	15⅝	15⅝	21⅜	21⅜	22¾	22¾	26
Height	16	16	23¾	23¾	27	27	31
Refrigeration Capacity							
In lbs. I.M.E. per 24 hours	212	268	282	387	588	737	1120
Compressor Specifications							
Compressor speed (r.p.m.)	340	430	225	310	255	320	250
No. of cylinders	1	1	2	2	2	2	2
Bore (in.)	1⅞	1⅞	1⅞	1⅞	2½	2½	3
Stroke (in.)	2	2	2	2	2	2	2⅝
Motor size (hp.)	¼	⅓	⅓	½	¾	1	1½
Quantity of refrigerant in system (lbs.)	3	3½	3½	4½	4½	8	12
Pump down capacity of receiver (lbs.)	4.5	4.5	5.5	5.5	19.0	19.0	19.0
Quantity of lubricant in system (lbs.)	2.9	2.9	3.7	3.7	3.7	3.7	7.0

Model No.	WM 51-13	WM 51-12	WM 52-34	WM 52-10	WM 53-15	WM 53-20	WM 54-30
Overall Dimensions (in.)							
Width	35½	35½	39¼	39¼	43⅜	43⅜	43⅝
Depth	17¼	17¼	18⅜	18⅜	22¼	22¼	23⅛
Height	24½	24½	25	25	32	32	32⅜
Refrigeration Capacity							
In lbs. I.M.E. per 24 hours	387	523	817	990	1570	1935	2900
Compressor Specifications							
Compressor speed (r.p.m.)	310	420	355	430	350	430	430
No. of cylinders	2	2	2	2	2	2	3
Bore (in.)	1⅞	1⅞	2½	2½	3	3	3
Stroke (in.)	2	2	2	2	2⅝	2⅝	2⅝
Motor size (hp.)	⅓	½	¾	1	1½	2	3
Quantity of refrigerant in system (lbs.)	4	4½	5	8	12	12	15
Pump down capacity of receiver (lbs.)	8	8	13	13	25	25	30
Quantity of lubricant in system (lbs.)	3.7	3.7	3.7	3.7	7.0	7.0	10.0

* * *

Compressor
Type of system.....Conventional
Type of compressor.....Reciprocating
Compressor drive.....Belt
Type of shaft seal.....Bellows (Carrier)
Cylinder head cooled by.....Air
Type of lubrication system.....Splash

Condenser & Liquid Receiver
Method of cooling.....AM models—air cooled; WM models—water cooled
Type of condenser.....Finned tube on AM models; shell & coil on WM models
Type of liquid receiver.....Horizontal

Refrigerant
Kind used.....Methyl chloride or Freon

Motor
Make of motor.....Wagner

Control
Make of control.....Tagliabue
Type of control.....Pressure
High pressure cut-out.....Bellows snap-action high pressure cut-out on WM
Point of operation of cut-out.....125 lbs.
Condensing water flow controlled by.....Pressure
Type of overload cut-out.....Thermal

Valves
Type of discharge valve.....Plate
Type of suction valve.....Disc
Type of water valve.....Bellows actuated

Materials Used
Cylinder block.....Nickel alloy semi-steel
Pistons.....Crucible iron
Condenser tubes.....Copper
Condenser shell.....Steel

Special Features
Receivers are fitted with a liquid level indicator. Air cooled models have the air circulating fan and condenser enclosed in an "air transformer."

ACE HARD RUBBER

***Roller Bearing* REFRIGERATOR DOORS**

of the center rail, groove type are supplied with roller bearings at a slight extra cost.

* * *

A wide range of standard sizes and styles of Ace hard rubber doors, door frames are available. Also, slide rails, jambs, trim, glazing strips, etc. Catalogue and prices available on request.

AMERICAN HARD RUBBER COMPANY
11 MERCER STREET, NEW YORK, N. Y.
Akron, Ohio — 111 West Washington St., Chicago, Ill.

Baker

Baker Ice Machine Co., Omaha, Neb.

Model No.	M A1	M A2	M A3	MH A1	MH A2	MH A3	MW A3	MWH A3	M B4	M B5	MH B4
Overall Dimensions (in.)											
Width	29¾	29¾	29¾	29¾	29¾	29¾	29¾	29¾	29¾	30¾	30¾
Depth	17	17¾	17¾	17¼	17¼	18¾	18½	20	19½	21	21
Height	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	21¼	21¼	21¼
Compressor Specifications											
Compressor speed (r.p.m.)	226	283	450	226	283	450	454	454	382	457	382
No. of cylinders	2	2	2	2	2	2	2	2	2	2	2
Bore (in.)	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞	2⅜	2⅜	2⅜
Stroke (in.)	1½	1½	1½	1½	1½	1½	1½	1½	1¾	1¾	1¾
Motor size (hp.)	¼	⅓	½	⅓	½	¾	½	¾	¾	1	1
Quantity of refrigerant in system (lbs.)	3	3	3	3	3	3	3	3	4	4	4

Model No.	MH B5	MW B4	MW B5	MWH B4	MWH B5	M C6	MH C6	MW C6	MW C7	MWH C6	MWH C7
Overall Dimensions (in.)											
Width	32¼	29¾	30¾	30¾	32¼	41¾	41¾	41¾	41¾	41¾	41¾
Depth	23¼	20½	22	22	24¼	24	25	24	25	25	25
Height	21¼	21¼	21¼	21¼	21¼	24½	24½	24½	24½	24½	24½
Compressor Specifications											
Compressor speed (r.p.m.)	357	300	328	408	486	218	218	231	272	231	272
No. of cylinders	2	2	2	2	2	2	2	2	2	2	2
Bore (in.)	2⅜	2⅜	2⅜	2⅜	2⅜	3	3	3	3	3	3
Stroke (in.)	1¾	1¾	1¾	1¾	1¾	3	3	3	3	3	3
Motor size (hp.)	1½	¾	1	1	1½	1½	2	1½	2	2	3
Quantity of refrigerant in system (lbs.)	4	4	4	4	4	6	6	6	6	6	6

* * *

Compressor
Type of system.....Conventional
Type of compressor.....Reciprocating
Compressor drive.....V-belt
Type of shaft seal.....Cooke frictionless
Cylinder head cooled by.....Air
Type of lubrication system.....Forced

Condenser & Liquid Receiver
Method of cooling.....W models—water; others—air
Type of condenser.....W models—double tube; others—radiator
Type of liquid receiver.....Horizontal
Has receiver fusible safety plug.....Yes

Refrigerant
Kind used.....Methyl chloride

Motor
Make of motor.....Wagner
Water-regulating valve

Control
Make of control.....Penn
Type of control...Pressure or temperature
High pressure cut-out.....On all models
Condensing water flow controlled by.....Pistons
Semi-steel

Valves
Type of discharge valve.....Poppet
Type of suction valve.....Poppet

Materials Used
Cylinder block.....Semi-steel
Condenser tubes.....Copper

Audiffren

Audiffren Refrigerating Sales Co., 9 Codding St., Providence, R. I.

Model No.	6	4	3
Overall Dimensions (in.)			
Width	142½	114	93½
Depth	65½	57	42
Height	55	51½	44½
Refrigeration Capacity			
In lbs. I.M.E. per 24 hours	3000	1500	750
Compressor Specifications			
Compressor speed (r.p.m.)	160	220	330
No. of cylinders	2	2	2
Bore (in.)	5-1/16	3⅝	2-9/16
Stroke (in.)	3-5/32	2-7/32	1-9/16
Quantity of lubricant in system (lbs.)	35	15	5
Motor size (hp.)	5	3	1½
Quantity of refrigerant in system (lbs.)	49½	19½	9¾

Compressor
Type of system.....Hermetic
Type of compressor.....Reciprocating
Compressor drive.....Belt
Cylinder head cooled by.....Splash cooling system
Type of lubrication system.....Splash

Motor
Make of motor.....Optional

Condenser & Liquid Receiver
Method of cooling.....Water
Type of condenser.....Drum
Does receiver have fusible safety plug.....When required

Refrigerant
Kind used.....Sulphur dioxide

Control
Make of control.....Allen-Bradley
Type of control.....Temperature
Type of high pressure cut-out...Temperature & gravity
Point of operation of cut-out.....90 lbs.
Condensing water flow controlled by.....Float-operated shutoff
Type of overload cut-out.....Magnetic

Valves
Type of discharge valve.....Feather
Type of suction valve.....Ports in oscillating cylinders
Type of water valve..Balanced float valve

Materials Used
Cylinder block.....Cast iron
Pistons.....Cast iron
Condenser shell.....Bronze

Special Features
Compressor, condenser, & evaporator incorporated in self-contained, hermetically sealed rotor.

for **COMMERCIAL REFRIGERATION AND COMFORT COOLING**

MINNEAPOLIS-HONEYWELL Refrigeration Controls are available in all desired temperature and pressure ranges. They are suitable for all types of commercial installations and are particularly adaptable to comfort cooling applications . . . A complete line of air conditioning controls, each especially designed to meet the requirements of its particular function is also available, enabling you to standardize on Minneapolis-Honeywell on every job . . . Minneapolis-Honeywell Regulator Co., 2807 Fourth Ave. S., Minneapolis, Minn. Branch or distributing offices in all principal cities.

Illustrated: Refrigeration Pressure Control L413-1
With typical Visible Scales, Con-Tac-Tor, Mercury Switches, Locking and Leveling Devices, Wide Range and Narrow Operating Differential.

MINNEAPOLIS-HONEYWELL
Control Systems

16 Manufacturers Sell 29,578 Household Refrigerators in U. S. During January

Member companies of the Refrigeration Division of the National Electrical Manufacturers Association (Nema) reporting sales include Apex, Crosley, Frigidaire, General Electric, Gibson, Grigsby-Grunow, Kelvinator, Norge, Servel, Stewart-Warner, Sunbeam, Trupar, Uniflow, Universal Cooler, Westinghouse, and Wurlitzer. Members not reporting sales are Merchant & Evans and Potter.

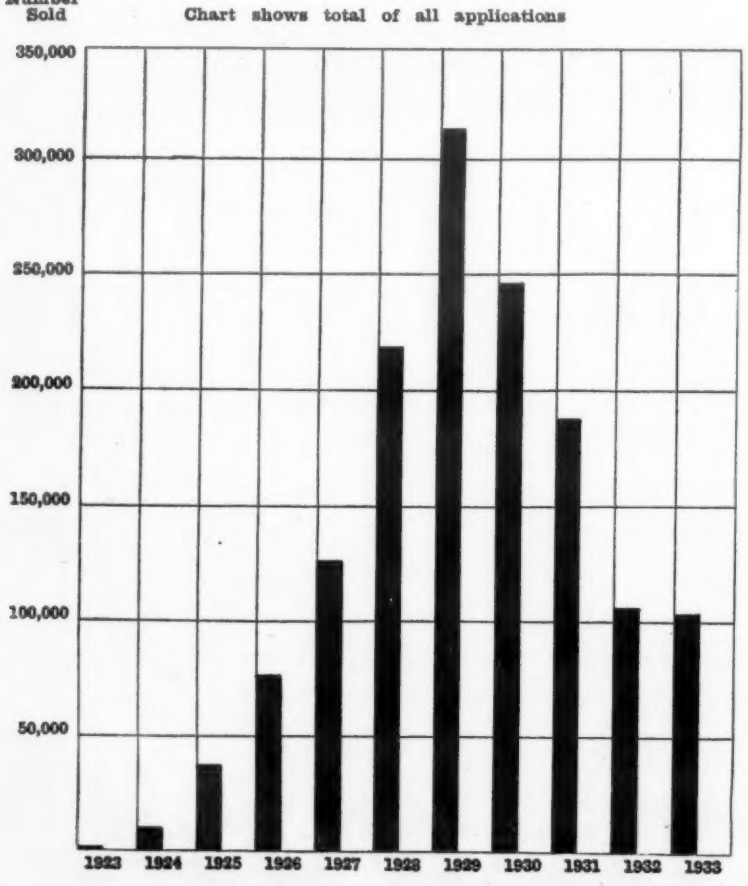
HOUSEHOLD Lacquer (Exterior) Cabinets With Systems	Domestic Sales Quantity	Domestic Sales Value	Canadian Sales Quantity	Canadian Sales Value	Other Foreign Sales Quantity	Other Foreign Sales Value
1. Under 4.00 cubic feet	1,029	$ 56,439	.....	.....	183	$ 9,937
2. 4 to 4.99 cubic feet	9,368	603,399	71	$ 4,827	2,459	177,199
3. 5 to 5.99 cubic feet	4,120	308,641	31	2,423	255	20,668
4. 6 to 6.99 cubic feet	4,316	382,446	57	5,146	640	60,596
5. 7 to 7.99 cubic feet	3,867	394,761	8	848	65	6,486
6. 8 to 9.99 cubic feet	76	9,567	.....	.....	7	642
7. 10 to 12.99 cubic feet	14	2,789	.....	.....	1	308
8. 13 to 24.00 cubic feet	9	1,908	.....	.....	.....	.....
9. Total Lacquer	**22,799**	**1,759,950**	**167**	**13,244**	**3,610**	**275,836**
Porcelain (Exterior) Cabinets With Systems						
10. Under 4.99 cubic feet	448	36,408	6	505	140	11,694
11. 5 to 5.99 cubic feet	491	47,342	2	300	43	3,898
12. 6 to 6.99 cubic feet	2,270	233,795	4	435	196	21,162
13. 7 to 7.99 cubic feet	1,568	194,304	1	122	172	21,253
14. 8 to 9.99 cubic feet	613	84,112	.....	.....	115	15,718
15. 10 to 12.99 cubic feet	171	28,578	.....	.....	77	12,994
16. 13 to 24.00 cubic feet	64	14,146	.....	.....	65	13,768
17. Total Porcelain	**5,625**	**638,685**	**13**	**1,362**	**808**	**100,487**
18. Total Lines 9 and 17	**28,424**	**2,338,635**	**180**	**14,606**	**4,418**	**376,323**
19. Separate Systems	925	40,167	.....	.....	136	5,434
20. Separate Household Low Sides	229	3,721	39	552	163	3,585
21. Total Lines 18, 19, 20	**29,578**	.....	**219**	.....	**4,717**	.....
22. High Sides, ¼ hp. or Less	198	9,736	8	363	1,104	60,678
23. Cabinets—No Systems	62	3,468	.....	.....	97	4,211
24. Total Household	.....	**2,455,727**	.....	**15,521**	.....	**450,231**
COMMERCIAL						
25. Water Cooler with High Sides	357	35,776	2	223	46	5,696
26. Water Coolers with No High Sides	37	1,889	.....	.....	5	260
27. Ice Cream Cabinets with High Sides	56	7,704	.....	.....	44	6,467
28. Ice Cream Cabinets with No High Sides	88	12,318	1	61	7	812
29. Beverage Coolers with High Sides	169	11,583	.....	.....	6	724
30. Beverage Coolers with No High Sides	67	3,613	.....	.....	17	763
31. Room Coolers with High Sides	13	2,309	.....	.....	.....	.....
32. Room Coolers with No High Sides	54	5,806	.....	.....	2	168
Extra High Sides						
33. ⅛ to ½ hp. incl.	454	36,356	10	917	1,690	142,374
34. Above ½ to 1 hp. Incl.	342	46,412	30	3,265	552	69,119
35. Above 1 to 5 hp. Incl.	195	40,848	5	761	168	28,594
36. Above 5 to 10 hp. Incl.	2	2,350	.....	.....	10	4,953
37. Above 10 hp.	1	714	.....	.....	.....	.....
38. Total Lines 33, 34, 35, 36 and 37	*994	.....	45	.....	2,420	.....
39. Total Lines 25, 27, 29, 31, and 38	*1,589	.....	47	.....	2,516	.....
40. Extra Commercial Low Sides	1,968	65,935	97	2,881	1,106	34,289
41. Miscellaneous Cases and Cabinets	20	5,280	.....	.....	7	2,031
42. Total Commercial	.....	*$278,893	.....	8,108	.....	296,250
43. Totals—Household and Commercial	.....	*$2,734,620	.....	$23,629	.....	$746,481

*Two companies did not report in breakdown form, so in order not to delay the January summary we have added their totals to the report as follows:

	World Sales Quantity	World Sales Value	Factory, Branch, & Warehouse Value	Distributor Quantity	Distributor Value	Production Quantity
Line 9.	....	.....	.....	.....	.....	20,980
Line 18.	....	.....	.....	.....	.....	26,386
Line 21.	....	.....	.....	40,670	.....	55,715
Line 24.	....	.....	.....	.....	$3,681,139	.....
Line 38.	1,359	.....	.....	3,115	.....	1,589
Line 39.	1,954	.....	.....	5,884	.....	2,597
Line 42.	....	$ 327,643	.....	.....	$ 972,389	.....
Line 43.	....	$2,783,370	$23,220,517	.....	$4,653,528	.....

102,458 Commercial Refrigerators Sold During 1933

Year	Water Coolers	Ice Cream Cabinets	Other Applications	Totals
1928	14,511	51,244	151,747	217,502
1929	30,999	55,512	227,767	314,278
1930	35,545	51,516	158,606	245,667
1931	23,153	41,423	122,705	187,281
1932	11,497	21,047	72,801	105,345
1933	14,662	9,438	78,358	102,458
Total	**130,367**	**230,180**	**811,984**	**1,172,531**



55,500 Household Refrigerators Made in January By 16 Nema Companies

HOUSEHOLD Lacquer (Exterior) Cabinets with Systems	U. S. A. INVENTORIES Factory, Branch, & Warehouse Quantity	Factory, Branch, & Warehouse Value	Distributors Quantity	Distributors Value	Dealers Quantity	Dealers Value	Production Quantity
1. Under 4.00 cubic feet	858	$ 58,837	458	$ 24,853	2	$ 128	771
2. 4 to 4.99 cubic feet	56,587	3,885,308	9,238	626,144	7,420	479,014	8,217
3. 5 to 5.99 cubic feet	20,125	1,539,243	5,267	377,917	2,535	184,723	6,700
4. 6 to 6.99 cubic feet	15,805	1,332,245	5,106	459,519	6,087	544,103	1,209
5. 7 to 7.99 cubic feet	19,043	2,032,987	4,383	457,583	3,186	350,443	3,740
6. 8 to 9.99 cubic feet	1,143	144,138	989	124,984	324	46,548	37
7. 10 to 12.99 cubic feet	389	70,522	175	34,098	101	19,557	1
8. 13 to 24.00 cubic feet	175	35,108	69	16,379	14	3,404	.....
9. Total Lacquer	**114,125**	**9,098,388**	**25,685**	**2,121,477**	**19,669**	**1,627,920**	***20,765**
Porcelain (Exterior) Cabinets with Systems							
10. Under 4.99 cubic feet	12,386	1,104,768	1,303	115,274	1,372	120,018	1,537
11. 5 to 5.99 cubic feet	3,328	328,007	990	98,257	342	32,978	1,224
12. 6 to 6.99 cubic feet	10,449	1,084,257	2,390	263,818	3,368	368,245	1,699
13. 7 to 7.99 cubic feet	17,299	2,170,045	2,706	349,103	3,808	477,645	885
14. 8 to 9.99 cubic feet	4,778	658,894	1,060	149,235	1,501	205,434	43
15. 10 to 12.99 cubic feet	1,423	242,868	363	65,682	445	76,615	18
16. 13 to 24.00 cubic feet	1,290	278,625	306	72,275	148	33,332	.....
17. Total Porcelain	**50,953**	**5,867,464**	**9,118**	**1,113,644**	**10,984**	**1,314,267**	**5,406**
18. Total Lines 9 and 17	**165,078**	**14,965,852**	**34,803**	**3,235,121**	**30,653**	**2,942,187**	***26,171**
19. Separate Systems	2,908	153,144	438	17,615	.....	.....	4,146
20. Separate Household Low Sides	13,633	207,247	429	8,092	219	3,713	25,183
21. Total Lines 18, 19, and 20	**181,619**	.....	***35,670**	.....	**30,872**	.....	***55,500**
22 High Sides, ¼ hp. or Less	7,529	356,260	221	14,734	169	8,805	23,935
23. Cabinets—No Systems	51,049	2,628,095	110	10,577	34	2,824	36,625
24. Total Household	.....	**18,310,598**	.....	***3,286,139**	.....	**2,957,529**	.....
COMMERCIAL							
25. Water Coolers with High Sides	7,421	738,078	2,346	245,243	519	46,438	379
26. Water Coolers with No High Sides	2,567	85,012	75	3,481	16	625	26
27. Ice Cream Cabinets with High Sides	3,438	479,150	139	18,421	4	570	477
28. Ice Cream Cabinets with No High Sides	4,462	651,584	238	46,381	15	1,715	35
29. Beverage Coolers with High Sides	1,791	124,409	209	13,768	235	14,680	140
30. Beverage Coolers with No High Sides	577	27,921	148	6,883	46	1,763	.....
31. Room Coolers with High Sides	.....	.....	.....	.....	.....	.....	12
32. Room Coolers with No High Sides	1,405	133,913	233	21,073	64	5,607	45
33. Extra High Sides, ⅛ to ½ hp. Incl.	9,460	752,696	1,621	157,239	466	41,004	737
34. Extra High Sides Above ½ to 1 hp. Incl.	3,072	409,117	748	99,710	242	31,334	409
35. Extra High Sides Above 1 to 5 hp. Incl.	1,642	315,394	484	99,278	115	21,274	158
36. Extra High Sides Above 5 to 10 hp., Incl.	41	21,611	12	6,098	.....	.....	3
37. Extra High Sides Above 10 hp.	.....	.....	.....	.....	.....	.....	.....
38. Total Lines 33, 34, 35, 36, and 37	**14,215**	.....	***2,865**	.....	**823**	.....	***1,307**
39. Total Lines 25, 27, 29, 31, and 38	**26,865**	.....	***5,559**	.....	**1,581**	.....	***2,315**
40. Extra Commercial Low Sides	25,427	786,707	4,019	147,896	1,098	34,303	1,633
41. Miscellaneous Cases and Cabinets	.....	269,327	.....	69,492	.....	12,402	5
42. Total Commercial	.....	**4,794,919**	.....	***934,963**	.....	**211,715**	.....
43. Totals—Household and Commercial	.....	***$23,105,517**	.....	***$4,221,102**	.....	**$3,169,244**	.....

* See explanation in columns one and two.

Nema Sales Analyzed by States for January

States and Territories	Quantity of Household Low Sides
Alabama	121
Arizona	92
Arkansas	163
California	1,257
Colorado	365
Connecticut	418
Delaware	63
District of Columbia	214
Florida	210
Georgia	254
Idaho	40
Illinois	2,050
Indiana	772
Iowa	362
Kansas	276
Kentucky	422
Louisiana	137
Maine	179
Maryland	452
Massachusetts	1,109
Michigan	1,458
Minnesota	443
Mississippi	72
Missouri	1,130
Montana	28
Nebraska	318
Nevada	13
New Hampshire	78
New Jersey	1,474
New Mexico	54
New York	6,154
North Carolina	306
North Dakota	47
Ohio	1,875
Oklahoma	372
Oregon	325
Pennsylvania	2,520
Rhode Island	283
South Carolina	223
South Dakota	120
Tennessee	287
Texas	1,191
Utah	66
Vermont	66
Virginia	339
Washington	348
West Virginia	322
Wisconsin	679
Wyoming	30
U. S. Miscellaneous	1
Total United States	**29,578**
Total Canada	219
Other Foreign (Including U. S. Possessions)	4,717
Total for World	**34,514**

Commercial Refrigerator Sales for 1933 Set At 102,458 Units

(Concluded from Page 1, Column 4)

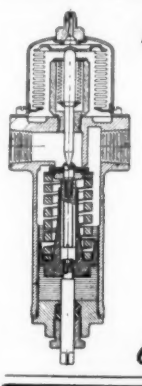
sales amounted to 314,200, the yearly commercial volume has decreased in each succeeding year, the total for 1933 being the lowest since 1926.

Included in the 1933 total are itemized sales as follows: water coolers, 14,622; ice cream cabinets, 9,438; and other applications (milk coolers, room coolers, counters and commercial boxes, and extra commercial low sides), 78,358.

No attempt was made to estimate an "average price" for commercial refrigerators, as the variety of applications to which the term "commercial" is applied makes it difficult to obtain a representative figure.

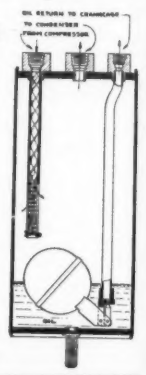
Nema companies sold 93,144 commercial electric refrigerators during 1933, of which 13,329 were water coolers, 8,580 ice cream cabinets, and 71,235 miscellaneous commercial jobs. Total dollar value of Nema commercial sales in 1933, including parts and miscellaneous, was reported at $11,086,273.

The chart on this page shows combined yearly sales of water coolers, ice cream cabinets, and other miscellaneous applications since 1923.



Automatic Oil Separators

PRESSURE WATER REGULATING VALVES
HIGH SIDE FLOATS — EXPANSION VALVES
FILTERS — STRAINERS — DRIERS
HYDRON BELLOWS — LUBRICANTS
SOFT SEAT PACKLESS VALVES
AND OTHER ACCESSORIES
WRITE
RILEY ENGINEERING CORP.
642 Beaubien St. Detroit, Mich.



KASON'S

K-40A
Refrigerator Latch

Patented Micrometer Adjustable Strike
Permits offset adjustments to the thousandth of an inch.

Send for Literature—Samples on Approval
KASON HARDWARE CORPORATION, 61-67 Navy St., BROOKLYN, N.Y.

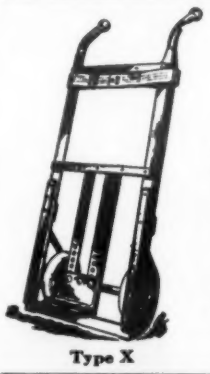
COPELAND REPAIRS — REPLACEMENTS

REPAIRS		REPLACEMENT PARTS	
B & B Household Controls	$2.50	Howell Special Capacitor Type ⅛ HP Refrigerator Motor	$11.00
Penn Household Controls	2.50	Amer. Rad. Household Exp. Valve	4.25
Penn Commercial Controls	4.50	Amer. Rad. Multiple Exp. Valve	7.50
Amer. Rad. Household Exp. Valve	2.50	Penn Commercial Controls	$8 & $12.00
Amer. Rad. Multiple Exp. Valve	3.50	Iso Butane (Freezol) Per lb.	1.50
Apex Water Regulating Valve	3.50	Methyl Chloride, Per lb.	.70
Penn Water Regulating Valve	3.50		

We also carry a complete stock of Gilmer Belts, Penn Water Regulating Valves, Glass Defrosting Trays, Lead and Fibre Gaskets Etc. WRITE FOR PRICES.

Forty Eight Hour service on repairs, immediate shipment on replacements. All Repairs and Parts guaranteed to be free from defects in Workmanship, and Material for ONE YEAR.

REFRIGERATION SERVICE LABORATORIES, INC.
418-20 Rush Street Chicago, Illinois.



Type X

The Dayton CARRIER Truck
Deliver Your Refrigerators on Rubber

Type X has 53 inch Handles and 8 inch Rubber Wheels. Type Y has 70 inch Handles, 5 inch Rubber Wheels and skids.

Type X with one strap $16.00
Type Y with one strap $17.50
f.o.b. Dayton

International Engineering Inc.
Dayton, Ohio
15 Park Row — New York

Type Y

RACK'S KOILS KOOL

THE TRADEMARK OF FOUR
PACE SETTERS
IN COIL EFFICIENCY

SUR-E-FEX	Fin Coils
FAN-E-FEX	Diffusing Units
HUM-E-FEX	Non-Dehydrating Coils
AIR-E-FEX	Air-Conditioning Units

SEND FOR NEW CATALOG DESCRIBING THESE SENSATIONAL DEVELOPMENTS

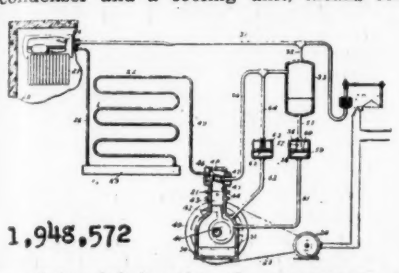
REFRIGERATION APPLIANCES, INC.
H. J. KRACKOWIZER, Pres.
1342 WEST LAKE ST., CHICAGO

PATENTS

Issued Feb. 27, 1934

1,948,572. REFRIGERATING APPARATUS. William B. Floyd, Dayton, Ohio, assignor to Frigidaire Corp., Dayton, Ohio, a corporation of Delaware. Application Feb. 27, 1931. Serial No. 518,701. 10 Claims. (Cl. 62—115.)

1. Refrigerating apparatus comprising a closed circuit including a compressor, a condenser and a cooling unit, means for



1,948,572

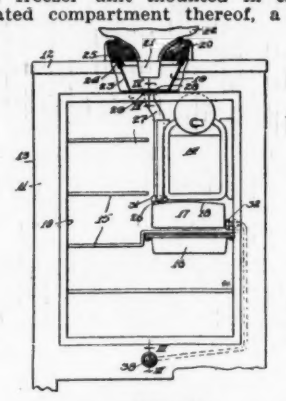
supplying lubricant to the compressor, a lubricant separator in said circuit, and automatic means for supplying lubricant from the separator to the lubricant supply means only when the compressor is idle.

1,948,587. REFRIGERATING APPARATUS. John A. Macready and William H. Matthews, Dayton, Ohio, assignors to Frigidaire Corporation, Dayton, Ohio, a corporation of Delaware. Application June 29, 1929. Serial No. 374,640. 4 Claims. (Cl. 220—9.)

1. A knock-down refrigerator cabinet comprising a plurality of walls, each wall including inner and outer spaced metal plates, insulating material between said plates, some of said walls, having the metal plates extending inwardly and bent to form a groove, the complementary walls having tongues extending into said grooves, thereby providing a breaker strip between said metal walls.

1,948,644. WATER COOLER. Howard E. Blood and Orrin A. Brandel, Detroit, Mich., assignors to Norge Corp., Detroit, Mich., a corporation of Michigan. Application Jan. 9, 1931. Serial No. 507,564. 4 Claims. (Cl. 62—116.)

1. In combination with a refrigerator and a freezer unit mounted in the refrigerated compartment thereof, a water



1,948,644

cooling reservoir in said compartment positioned beneath said freezer unit, a water bottle fount positioned outside the refrigerator for feeding water to said cooling reservoir, conduit means connecting said fount and said reservoir, said means including readily detachable connections for facilitating the removal and cleaning of said reservoir, a draw-off connection from said reservoir, and a faucet connected thereto and mounted on the outside of said refrigerator.

1,948,647. AIR CONDITIONING APPARATUS. Thomas Bayard Brunt, Philadelphia, Pa. Application April 27, 1932. Serial No. 607,864. 10 Claims. (Cl. 257—138.)

5. Air-conditioning apparatus, comprising an air-conditioning device having a conditioning medium conduit with a continuous long, wide, and shallow portion, said portion having its width disposed substantially vertically, one side of said portion forming a wall for a humidifying fluid reservoir, radiating fins extending from the other side of said portion, means for directing a stream of air upward through said fins, a damper for opening and closing said reservoir to the atmosphere, said damper having a deflecting surface for directing humidifying vapor into the path of said stream of air and means for controlling said damper in accordance with the humidity of the atmosphere about said device.

1,948,681. COMBINED REFRIGERATOR AND ICE CREAM FREEZER. Albert F. Sawyer, Haverhill, Mass., assignor to Irving L. Keith, Haverhill, Mass. Application Feb. 13, 1931. Serial No. 515,474. 2 Claims. (Cl. 62—101.)

1. In combination with a refrigerating tank having a low point freezing liquid therein, and means for maintaining the temperature thereof at a required low point, an auxiliary chamber having its sides extending vertically between the top and bottom of said tank and arranged in open communication at its upper and its lower ends with the interior of said tank at corresponding levels, to permit the liquid therein to be thermally circulated from the tank into said chamber at its lower end, upward in said chamber and outward therefrom at its upper end back into the tank, thereby to effect a heat exchange between the liquid in said chamber and that in the tank, and a container vertically disposed within said chamber and completely surrounded at its sides by the liquid therein, the top of said container opening to the exterior of said tank and chamber and having a suitable closure.

1,948,773. VENT FOR TANKS. Francis Shenton, Waynesboro, Pa., assignor to Frick Co., Waynesboro, Pa., a corporation of Pennsylvania. Application Jan. 2, 1930. Serial No. 418,046. 3 Claims. (Cl. 62—115.)

1. In a refrigerating system, a liquid chamber having inlet and outlet connections thereto, a float operated valve for controlling the outlet, a vent connection positioned in the top of said chamber, said vent being connected to the discharge pipe from said chamber, said vent having a loosely positioned rod therein to reduce its diameter, substantially as set forth.

1,948,775. CONCEALED HINGE FOR REFRIGERATORS. Jacob Teller, Chicago, and Arthur P. Schulz, Berwyn, Ill., assignors, by mesne assignments, to Teller Stove Designing Corp., a corporation of New York. Application Jan. 24, 1931. Serial No. 511,048. 1 Claim. (Cl. 16—135.)

A flat leaf type hinge comprising a pair of leaf elements each having a knuckle and arranged in superposed edge-to-edge relationship adjacent the knuckles, a pintle connecting the knuckles of said leaves for pivotal movement thereon, one element of the hinge having substantially right angularly extending continuous portions, the angular portion remote from the knuckle constituting an attaching means, and the other leaf element having a section intermediate its ends angularly disposed with respect thereto providing an offset attaching section remote from its knuckle adapted to extend in a plane parallel to the plane of the attaching portion of the other leaf element, whereby said leaf elements are constantly in mutually contacting edge-to-edge relationship at points remote from the knuckles in all operative positions.

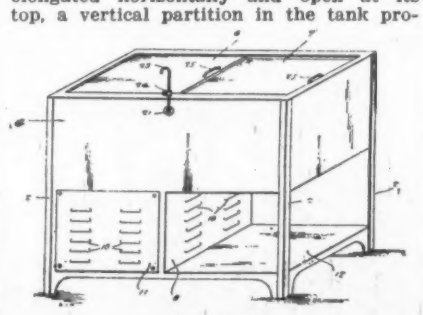
1,948,779. ADSORPTION SYSTEM. Cornelius Frederick Abbott and Charles A. Conklin, 3d, Baltimore, Md., assigners, by mesne assignments, to Chester F. Hockley, receiver for The Silica Gel Corp., Baltimore, Md., a corporation of Maryland. Application June 30, 1931. Serial No. 548,050. 16 Claims. (Cl. 183—4.)

1. The method of continuously removing a condensible from a gaseous mixture comprising passing the mixture successively into contact with two batches of adsorbent, conditioning the mixture while in contact with one batch to activate one batch and to charge the other with condensible, removing condensible from the mixture in passing between batches, and periodically reversing the positions of the batches in the circuit.

14. The method of removing a condensible from a gaseous mixture comprising contacting the mixture and adsorbent partially saturated with the condensible, under reduced pressure thus enriching the mixture and activating the adsorbent, then cooling the mixture and removing the condensed condensible, then passing the mixture into contact with active adsorbent, delivering the stripped gas and periodically reversing the positions of the adsorbents in the cycle.

1,948,780. REFRIGERATOR. Harold B. Adams, Monett, Mo. Application Oct. 21, 1931, Serial No. 570,190. Renewed Oct. 26, 1933. 2 Claims. (Cl. 62—89.)

1. A refrigerator comprising a tank elongated horizontally and open at its top, a vertical partition in the tank pro-



1,948,780

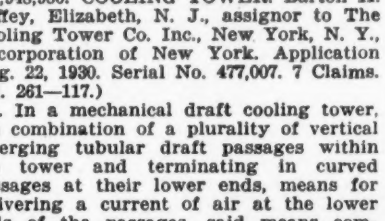
viding a pair of compartments, closures for the compartments slidably mounted in an upper portion of the tank, a housing depending from the tank beneath one of the compartments, a refrigerating unit mounted in the housing, cooling coils mounted in the said compartments and operatively connected with the refrigerator unit, and a shelf extending horizontally from the housing in spaced relation beneath the other compartment.

1,948,790. REFRIGERATING SYSTEM. Ralph V. Grayson, Atlanta, Ga., assignor of 50 per cent to E. G. Ballenger, C. M. Foster, and F. M. Bird, all of Atlanta, Ga., as organizers and incorporators of Refrigeration Patents and Processes, Inc., a corporation to be organized under the laws of Georgia. Application Sept. 10, 1930. Serial No. 480,997. 9 Claims. (Cl. 62—104.)

1. Refrigeration system comprising, means, defining a conduit for the re-current circulation of refrigerated air, said means including a tunnel, and an endless conveyor for the product to be frozen, having a portion thereof traveling, longitudinally within said tunnel, of such length and traveling at such speed as to effect the requisite freezing during the sojourn of said product within said tunnel, said conveyor including means cooperating with a wall of said tunnel for repeatedly overturning the product to be frozen during it progress within said tunnel.

1,948,846. ELECTRIC REFRIGERANT COMPRESSOR. Philip W. Des Roches, Detroit, Mich. Application July 27, 1929. Serial No. 381,650. 12 Claims. (Cl. 230—58.)

1. In a compression refrigerating system, a compressor, a thermic insulating member forming a chamber and a pas-



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sageway for conducting the gas refrigerant to the intake port of the compressor to prevent the heat of the compressor from heating the gas in advance of its compression, the said chamber operating to permit expansion of the gas and the separation of liquids contained in the refrigerant circuit prior to the induction of the gas into the compressor.

1,948,954. REFRIGERATOR TRUCK BODY. John Alvin Weiland, Phoenixville, Pa. Application Sept. 2, 1932. Serial No. 631,474. 7 Claims. (Cl. 62—13.)

1. A refrigerator truck body, comprising in combination, a truck body divided into two sections one of said sections having a door leading thereto from the outside of the body and the other section being accessible from the first mentioned section, an ice bunker located within the second mentioned section at a place distant from the door leading to the interior of the body, said bunker having inclined walls whereby gravity will cause ice to maintain constant contact with said inclined walls, said ice bunker having air passageways along the inclined walls communicating at their upper ends with the upper portion of said second mentioned section.

1,948,980. COOLING TOWER. Barton H. Coffey, Elizabeth, N. J., assignor to The Cooling Tower Co. Inc., New York, N. Y., a corporation of New York. Application Aug. 22, 1930. Serial No. 477,007. 7 Claims. (Cl. 261—117.)

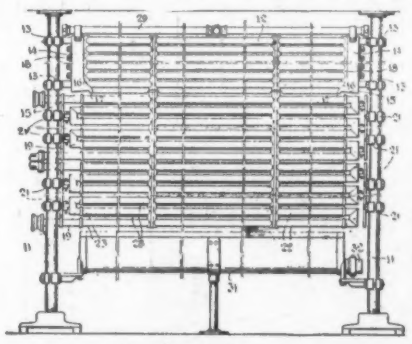
1. In a mechanical draft cooling tower, the combination of a plurality of vertical diverging tubular draft passages within the tower and terminating in curved passages at their lower ends, means for delivering a current of air at the lower ends of the passages, said means comprising an air inlet adjacent the base of the tower, a fan adjacent the said inlet and spaced therefrom, and means for adjustably positioning said fan toward and from said air inlet, means for delivering spray above the draft passages, and means for collecting the water at the base of the tower.

1,949,039. ICE DISPENSING APPARATUS. Herman W. Clausen and Peter C. Clausen, Los Angeles, Calif. Application Dec. 21, 1931. Serial No. 582,344. 3 Claims. (Cl. 312—96.)

1,949,040. APPARATUS FOR RECEIVING AND DISPENSING BLOCKS OF ICE. Herman W. Clausen, Los Angeles, Calif., assignor of one-half to Peter C. Clausen, Los Angeles, Calif. Application Feb. 14, 1933. Serial No. 656,716. 5 Claims. (Cl. 312—35.)

1,949,126. MILK COOLER. Albert T. Light, Canton, Ohio, assignor to York Ice Machinery Corp., York, Pa., a corporation of Delaware. Application June 16, 1931. Serial No. 544,861. 4 Claims. (Cl. 257—183.)

1. In a milk cooler, a plurality of superposed horizontal cooling tubes; a pre-cooler disposed above said tubes; a header



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at each end of the pre-cooler, the bottom surface of each header being inclined downwardly toward the outer end thereof; and a plurality of vertically aligned wedge-shaped deflectors on the tubes disposed beneath said inclined surfaces.

1,949,127. HEAT EXCHANGER. Albert T. Light, Canton, Ohio, assignor to York Ice Machinery Corp., York, Pa., a corporation of Delaware. Application Feb. 20, 1932. Serial No. 594,263. 6 Claims (Cl. 267—183.)

4. In a heat exchanger of the trickler type, a plurality of superposed substantially horizontal tubes; return bends connecting successive tubes to form a passage for heat exchanging fluid, said tubes and bends being located in the path of trickling flow; a sustaining plate at opposite ends of the tubes adjacent the return bends and outside the path of trickling flow; and supporting lugs on certain return bends, said lugs being inclined upward from their respective bends to a point of connection with the plates, the inclination of the lugs serving to preclude flow of trickling liquid along the lugs to the plates.

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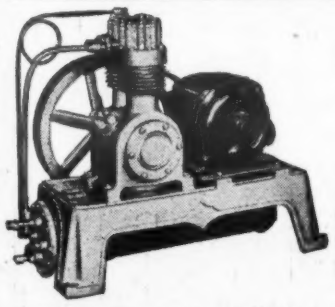

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